HD 1761
G6
#248

Division of Agricultural Sciences

UNIVERSITY OF CALIFORNIA

REGIONAL SUPPLY AND DISTRIBUTION OF FEED, 1957-58

Gordon A. King

UNIVERSITY OF CALIFORNIA
DAVIS
NOV 28 1961
LIBRARY

CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

Giannini Foundation Research Report No. 248 August 1961

TABLE OF CONTENTS

Page

INTRODUCTION 1

REGIONAL FEED CONCENTRATE BALANCE 2

  Major Areas of Production and Consumption 2

  Regions Classified as to Feed Balance 2

  Trade Flows in Feed Concentrates 4

REGIONAL LIVESTOCK PRODUCTION--CONSUMPTION BALANCE 7

  Regional Consumption of Major Livestock Products 7

  Regional Production of Major Livestock Products 7

  Factors Affecting Regional Composition of Livestock Production 10

ESTIMATION OF REGIONAL SUPPLY AND DISTRIBUTION OF FEED 18

  General Approach 18

  Livestock Numbers, Production, and Feeding Rates 21

  Feed Production, Stocks and Non-Feed Uses 53

  Foreign Trade 56

  Domestic Shipments 65

LIST OF TABLES

Table — Page

1 Feed Concentrate Balance: Regional Production, Quantity Fed and Net Shipments, in Millions of Tons, 1957-1958 and 1949-1950 . . . 3

2 Rail and Domestic Water Shipments of Major Feed Concentrates and Relative Importance of Regional Sources and Destinations 5

3 Consumption of Major Livestock Products: Per Person or Per Household Quantity Used in One Week, 1955, United States; Regional Consumption Per Person Expressed as a Percentage of United States Averages and Aggregate Regional Consumption, 1958, Expressed as a Percentage of United States Consumption 8

4 Regional Production of Major Livestock Products, 1958, Expressed as a Percentage of United States Production, and as a Percentage of Regional Consumption 9

LIST OF TABLES

Table Page

5 Comparison of Feed Requirements Per 100 Pounds of Product with Relative Transfer Costs for Feed and Product. 13

6 Production-Consumption Balance for Major Livestock Products, for Sub-Regions Grouped According to Feed Balance, 1958 15

7 Feed Concentrates: Supply and Distribution, by Regions, in Thousands of Tons, Year Beginning October 1, 1957. 19

8 Concentrates Fed to Animals, by Regions, in Thousands of Tons, Year Beginning October 1, 1957 22

9 California: Estimated Concentrates Fed Per Head or Per Production Unit, and Total Fed, Year Beginning October 1, 1957 23

10 California: Feed Supply and Distribution, Year Beginning October 1, 1957 25

11 Milk Cows: Number, Production, and Concentrates Fed, by Region, Year Beginning October 1, 1957. 26

12 Other Dairy Cattle: Number and Concentrates Fed, by Region, Year Beginning October 1, 1957 27

13 Beef Cows, Bulls and Other: Number and Concentrates Fed, by Region, Year Beginning October 1, 1957. 28

14 Beef Cattle Grain Fattened: Number Marketed, Estimated Number of Days on Feed, Assumed Weight Gain Per Day, Calculated Weight Gain, and Estimated Concentrates Fed, Year Beginning October 1, 1957. . 30

15 Fed Cattle and Calves Marketed: Estimated Number and Estimated Average Number of Days on Feed, Year Beginning October 1, 1957. . 31

16 Fed Cattle and Calves: Number on Feed, Classified by Length of Time on Feed at Beginning of Each Quarter, 21 States, in Thousands of Head, October 1, 1958-October 1, 1959 35

17 Fed Cattle and Calves: Method used in Estimating Average Number of Days on Feed 35

18 Sheep Grain Fattened and Stock Sheep: Number and Concentrates Fed, Year Beginning October 1, 1957. 36

19 Hogs: Number Fed, Liveweight Production, Average Liveweight of Slaughter and Estimated Concentrates Fed, Year Beginning October 1, 1957 38

LIST OF TABLES

Table Page

20 Hogs: Method Used in Estimating Concentrates Fed, by Liveweight, Year Beginning October 1, 1957. 40

21 Layers: Number, Eggs Produced, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Year Beginning October 1, 1957 42

22 Layers: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight and Level of Egg Production, Year Beginning October 1, 1957 43

23 Farm Chickens: Number Raised, Production, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Calendar Year 1958. 44

24 Farm Chickens: Method Used in Estimating Concentrates Fed Per Bird Raised, Average for Light and Heavy Breeds, Calendar Year 1958. . 45

25 Broilers: Number Produced, Production, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Calendar Year 1958 . . 46

26 Broilers: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight, for Calendar Year 1958. 47

27 Turkeys: Number Raised, Production, Average Liveweight Per Bird and Estimated Concentrates Fed, by Region, Calendar Year 1958 . . 48

28 Turkeys: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight, for Calendar Year 1958. 49

29 Horses and Mules: Number, 2 Years Old and Over, Fed, Year Beginning October 1, 1957 50

30 Feed and Food Grains: Production of Feed Grains by Region, in Thousands of Tons, Relating to 1957 Crop for Corn and Sorghum Grains, and the 1958 Crop for Oats and Barley, and to Wheat and Rye Fed for Year Beginning October 1, 1957. 54

31 Stocks of Feed Grains: October 1, 1957 and 1958, by Regions, in Thousands of Tons 55

32 Corn, Oats, Barley, and Sorghum: Food and Industrial Uses, by Regions, in Thousands of Tons, Year Beginning October, 1957 . . . 57

33 Feed Grains: Use for Farm Food and Seed, in Thousands of Tons, Year Beginning October 1, 1957 58

34 High Protein Feeds: Production by Regions, in Thousands of Tons, Year Beginning October 1, 1957. 59

LIST OF TABLES

Table Page

35 Other Byproduct Feeds: Production by Regions in Thousands of Tons, Year Beginning October 1, 1957. 61

36 Stocks and Trade of Byproduct Feeds: October 1, 1957 and 1958, by Regions, in Thousands of Tons. 63

37 Domestic and Foreign Water Receipts and Shipments of Feed Grains and Animal Feeds, Not Elsewhere Classified, by Regions, in Thousands of Tons, Calendar Year 1958 66

38 Corn: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons 69

39 Oats: Region-to-Region Movement by Rail, Calendar Year 1958, in Thousands of Tons 70

40 Barley and Rye: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons. 71

41 Barley: Estimated Net Regional Shipments, Rail and Water and Net Foreigh Trade, Calendar Year 1958, in Thousands of Tons 72

42 Sorghum Grain: Region-to-Region Movement by Rail, Calendar Year 1958, in Thousands of Tons. 73

43 Animal and Poultry Feed Not Otherwise Specified: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons. . . 74

44 Mill Products Not Otherwise Specified: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons 75

45 Soybean Oil Cake and Meal: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons. 76

46 Cottonseed Cake and Meal: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons. 77

47 Vegetable Oil Cake and Meal: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons. 78

LIST OF FIGURE

Figure

1 Map of Conterminous United States Indicating Regional Demarcations 79

FOREWORD

This study of feed supplies and utilization by kind of livestock was developed primarily for use in connection with a study of the location of livestock feeding, with emphasis on the Western region. The information developed, however, provides a basis for an analysis of the regional feed concentrate balance and the regional livestock production-consumption balance in the United States. It is felt that these analyses will be of interest to the feed and livestock industries, and to research workers interested in the determinants of interregional trade flows.

This study is one phase of work being carried out by the California Agricultural Experiment Station under Western Regional Marketing Research, Project Number WM-37. This project is concerned with the economics of transportation of livestock and meats in the Western region, relating particularly to the effects on the location of beef cattle feeding and slaughter. Research is currently underway at California on a spatial equilibrium analysis of the location of cattle feeding operations, and on a study of economies of scale in beef slaughter plants. These studies will provide a basis for appraising the impact of shifts in regional demand, feed availability, and transportation rates on the optimum location of feeding and slaughter plants.1/

In preparing this report, the comments and suggestions of H. O. Carter, D. A. Clarke, Jr., and H. R. Shaw were particularly helpful, for which the author expresses his appreciation. Also, appreciation is expressed to Filmore Bender for the compilation of much of the basic production and trade data shown in the third section of this report.

1/ The general approach to this problem is outlined in a paper presented to the Western Regional Livestock Committee, WM-37, at Tucson, Arizona, February 9, 1960, by Gordon A. King, "Location of Cattle Feeding, Slaughter, Processing, and Consumption," (not available for distribution).

REGIONAL SUPPLY AND DISTRIBUTION OF FEED, 1957-58

by
Gordon A. King[1]

INTRODUCTION

California is one of several areas of the United States in which the quantity of feed concentrates fed to livestock exceeds production. This deficit for the year beginning October 1, 1957 is estimated at 1.0 million tons, with production of 4.1 million tons and quantity fed of about 5.1 million tons. With prospects for higher levels of demand for livestock products in the future, important questions are raised as to changes in the level and composition of livestock production. This study of the regional supply and distribution of feed in 1957-58 indicates the interdependence among regions in the production of feed and livestock products, and the implications as to the composition of livestock production in feed deficit areas.

This report is presented in three sections. The first section deals with the feed concentrate balance for major areas of the United States, indicating regional feed production, utilization and trade flow data for 1957-58. In the second section, an analysis is presented of the regional production-consumption balance for major livestock products. The regional composition of livestock production is appraised as affected by feed requirements for various kinds of livestock and by transportation rates for livestock products and feed concentrates. The third section presents in detail the methods used in obtaining the regional supply and distribution data on feed concentrates. Regional data are presented on livestock numbers, production and feeding rates; feed production, stocks, and non-feed uses; and on domestic and foreign trade in feed concentrates.

---

[1] Associate Professor of Agricultural Economics and Associate Agricultural Economist in the Experiment Station and on the Giannini Foundation, University of California, Davis, California.

REGIONAL FEED CONCENTRATE BALANCE

Major Areas of Production and Consumption

The North Central region produced about 72 percent of the total feed concentrate supply of the United States in 1957-1958, with the South producing 17 percent; the West, 7 percent; and the Northeast, 4 percent. The regional pattern of production of the sub-aggregates of the feed concentrate supply--feed grains, high-protein feeds, other by-product feeds, wheat and rye feed--follows closely that for total feed concentrates.

The regional pattern of feed concentrate use for feeding differs from that of production, as indicated in Table 1. The North Central region is by far the most important feeding area--60 percent of concentrates fed--but feed shipments to other regions are an important factor in the feed-livestock economy of the United States. Exports and domestic nonfeed uses also affect regional feed utilization.

Regional production and feed use developed in this study for 1957-1958 shows much the same pattern as data for 1949-1950 presented by Jennings.[1] However, production and feeding are more important now in the West whereas the reverse is true for the Northeast.

Regions Classified as to Feed Balance

Regions may be appraised as to the level of feed production in relation to the quantity fed. For analytical purposes, the United States was divided into 20 regions.[2] States included in the various regions are noted

---

[1] Jennings, R. D., Feed Consumed by Livestock, Supply and Disposition of Feeds, 1949-50, U. S. Department of Agriculture Statistical Bulletin 145, June 1954, p. 67.

[2] The regional breakdown was developed primarily for use in connection with a spatial equilibrium model of livestock feeding and slaughter, with emphasis on the western region. Therefore, the regional breakdown gives relatively more detail for this region than might otherwise be the case in an analysis of all livestock feeding. Due to the importance of cattle feeding and beef consumption in California, the state was divided into two regions (2 and 3) for the analysis of location of cattle feeding but data only for the entire state are given in this report.

TABLE 1

Feed Concentrate Balance: Regional Production, Quantity Fed and Net Shipments, in Millions of Tons, 1957-1958 and 1949-1950

Region	1957-1958			1949-1950 a/		
	production	fed	net shipments -out +in	production	fed	net in-shipments -out +in
Major regions						
Northeast	6.7	12.7	+ 8.1	7.0	13.1	+ 8.9
North Central	122.9	77.6	-22.2	105.7	72.1	-16.1
South	29.7	28.2	+ 5.1	26.0	27.5	+ 4.6
West	12.5	11.1	+ 0.8	9.0	8.2	+ 1.0
Continental United States	171.8	129.6	- 8.2b/	147.7	120.8	- 1.6b/
Sub-regions grouped as to feed balance: c/						
Quantity fed exceeds production:						
Northeast (18)	6.7	12.7	+ 8.1	7.0	13.1	+ 8.9
South (excl. 12)						
Va., N.C., S.C., Ga. (19)	6.7	9.6	+ 3.8	7.3	8.1	+ 1.4
Ark., La., Miss., Ala. (15)	5.6	6.5	+ 1.5	5.2	6.4	+ 1.7
W. Va., Ky., Tenn. (17)	4.9	5.4	+ 1.2	5.6	6.0	+ 0.9
Florida (20)	.6	1.3	+ .9	.5	.8	+ .4
California (2+3)	4.1	5.1	+ 1.8	2.8	3.3	+ 1.3
Production exceeds quantity fed:						
North Central						
Iowa, Ill., Mo. (14)	51.3	35.8	- 7.9	46.9	32.4	- 7.7
Neb., Kan. (11)	16.9	7.8	- 5.9	12.7	8.1	- 3.6
N. Dak., S. Dak. (10)	11.2	4.6	- 3.4	7.4	3.9	- 1.7
Mich., Ind., Ohio (16)	21.0	14.5	- 2.8	19.8	15.2	- 3.1
Minn., Wisc. (13)	22.4	14.9	- 2.2	18.9	12.5	d/
Oklahoma-Texas (12)	11.9	5.4	- 2.3	7.4	6.2	+ .2
Mountain states						
Mont., Wyo. (7), Col. (8)	3.9	2.0	- 1.0	2.5	1.7	- .4
Other (4) (5) (6) (9)	2.4	2.2	+ .2	2.0	1.6	e/
Wash., Ore. (1)	2.1	1.8	- .2	1.8	1.6	+ .1

a/ Jennings, R. D., Feed Consumed by Livestock, Supply and Disposition of Feeds, 1949-50, U. S. Department of Agriculture Statistical Bulletin 145, June 1954, p. 67.

b/ Net exports.

c/ Figures in parentheses are regional designations used in this report.

d/ Net inshipments of 12 thousand tons.

e/ Net outshipments of 48 thousand tons.

in Table 1 and also are illustrated in Figure 1, page 79. States or sub-regions in which quantity fed exceeds production include the Northeast, all sub-regions of the South except Region 12 (Oklahoma-Texas) and California. These regional data, shown in Table 1, indicate the relative dependence on inshipments of feed concentrates to livestock production in such regions as the Northeast. Much of the same dependence on inshipments is indicated for the 1949-1950 feeding year.

Regions for which production exceeds quantity fed includes all sub-areas of the North Central region; Oklahoma-Texas (region 12); the Mountain states; and Washington-Oregon in the Pacific states. The West as a whole is on a net inshipment basis due to the deficit position of California, small net inshipments into the Mountain states other than Montana, Wyoming, and Colorado, and relatively small net outshipments from Regions 1, 7, and 8. The bulk of feed shipments are from the North Central states although shipments from Oklahoma-Texas are important to the South and West.

Trade Flows in Feed Concentrates

The net shipments data for total concentrate supplies shown in Table 1 summarizes for the various individual feeds (a) the reported sample data on rail movements; (b) domestic and foreign water shipments; and (c) estimated "other" shipments required to balance estimated levels of concentrates fed with supplies.[1] Net shipments by rail and water equaled 21.9 million tons and "other" net shipments equaled 5.7 thousand tons for 1957-58. Exports in this period equaled 21.9 million tons and imports 2.5 million tons.

The gross regional shipments for the major feeds moving domestically by water and rail are given in Table 2.[2] The importance of the North Central

---

[1] Methods used in estimating concentrates fed to various kinds of livestock are indicated on p.   , and the estimated feed concentrate balance for the United States and for each region is summarized in Table 7.

[2] Detailed source and origin data are given for all reported feed shipments in Tables 37-47.

TABLE 2

Rail and Domestic Water Shipments of Major Feed Concentrates and
Relative Importance of Regional Sources and Destinations

Feed	Actual shipments			Relative importance of regional sources and destination							
				source				destination			
	rail	water	total	no. east	no. cent.	south	west	no. east	no. cent.	south	west
	1,000 tons			percent				percent			
Corn	10,616	3,970	14,586	0.38	95.50	3.65	.47	27.76	27.77	41.61	2.86
Animal and poultry feed	7,296	475	7,771	5.77	67.98	20.22	6.04	23.66	30.65	40.02	5.66
Sorghum grain	4,257	204	4,461	0.0	80.65	10.69	8.65	0.36	25.96	30.46	43.22
Barley and rye	4,081	612	4,693	3.92	69.23	.45	26.40	13.06	52.46	13.66	20.82
Mill products	3,346		3,346	0.60	88.14	7.59	3.68	25.88	38.43	29.71	5.98
Soybean meal	2,992		2,992	0.0	90.37	9.63	0.0	34.93	22.39	32.89	9.79
Oats	1,692	615	2,307	1.78	91.37	3.81	3.03	25.27	44.13	27.70	2.90

region as a source for feed shipments is clearly apparent for corn, oats, soybean meal, and mill products. Rail and water shipments data report only the movement of "barley and rye" and these data are included in Table 2. Barley shipments originate largely in the Dakotas.[1] Region 11--Nebraska and Kansas--is the major shipping area of sorghum grains, with important quantities moving from Region 14--Iowa, Illinois, and Missouri--and also from Region 12--Oklahoma and Texas. Animal and poultry feeds, assumed to be mainly formula feeds, are shipped in large quantities from the East North Central region to the deficit Northeast and Southeast. A large proportion of shipments originating in Southern regions also have destinations in this area, and the area is deficit on a net shipment basis.

The major destinations of rail and water shipments are the Northeast and South; however, the West is the important destination for sorghum grain shipments from Nebraska-Kansas and Oklahoma-Texas areas. Sorghum grain also moved from Nebraska-Kansas to Oklahoma-Texas by rail in large quantity.

The estimated level of "other" net shipments includes, in addition to water and rail shipments of such by-product feeds as molasses, major movement of feed by truck.[2] Important regions on a net inshipment basis for "other" shipments in the South--Regions 19, 18, 17, and 20--; the Northeast; and Western regions of California and Utah-Idaho. Important regions on a net outshipment basis of "other" shipments include Oklahoma-Texas and certain of the North Central Regions (16, 15, 11).

---

[1] An estimate of net barley shipments is given in Table 41.

[2] Regional estimates of "other" shipments are shown in Table 7.

REGIONAL LIVESTOCK PRODUCTION--CONSUMPTION BALANCE

Regional Consumption of Major Livestock Products

The regional pattern of consumption of major livestock products depends on population levels and the per capita consumption levels which reflect such factors as preference among meat categories and consumer incomes. Valuable information as to per capita consumption by region was provided in the 1955 Household Food Consumption Survey.[1/] These data were used to estimate the relative importance of the four major regions as consuming centers for five major livestock product categories in 1958, as shown in Table 3.

The North Central region, comprising 30 percent of the United States population in 1958, consumed a more than proportionate share of dairy products, beef and pork,but a less than proportionate share of eggs. The Northeast, comprising about 27 percent of the population, consumed a more than proportionate share of chicken, beef, and dairy products, but a less than proportionate share of eggs and pork. The South, comprising about 28 percent of the population consumed a more than proportionate share of pork, chicken, and eggs, but less beef and dairy products. The West, comprising about 15 percent of the population, consumed a more than proportionate share of beef and eggs, but a less than proportionate share of dairy products, pork, and chicken. Thus, each region shows a slightly different consumption pattern for these major livestock products.

Regional Production of Major Livestock Products

The North Central region accounted for 79 percent of the United States hog production in 1958, and about 50 percent of the production of dairy products, cattle and calves, and eggs (see Table 4). Production of chicken meat, however,

---

[1/] U. S. Department of Agriculture, Food Consumption of Households in the United States, Household Food Consumption Survey 1955, reports 1-5. For informative interpretation see, The National Food Situation, various issues, especially 79-pp. 27-62.

TABLE 3

Consumption of Major Livestock Products: Per Person or Per Household Quantity Used in One Week, 1955, United States; Regional Consumption Per Person Expressed as a Percentage of United States Averages and Aggregate Regional Consumption, 1958, Expressed as a Percentage of United States Consumption

Item	Quantity used at home in a week 1955 a/					Estimated regional consumption, 1958 expressed as a percent of U.S. b/					Population July 1, 1958	
	per person				per household							
	beef and veal	pork	chicken	eggs	dairy products c/	beef and veal	pork excl. lard	chicken	eggs	dairy products c/		
	pounds			No.	pounds	percent					millions	percent
U.S.	1.33	1.14	0.56	7.3	2.09	100	100	100	100	100	173.2	100
	(--percent of U.S. average--)											
Northeast	106	86	109	92	105	29	24	30	25	29	47.6	27
No. Cent.	119	108	96	101	117	34	32	28	30	35	51.1	30
South	67	111	102	104	79	19	31	29	29	22	49.2	28
West	127	88	91	108	99	18	13	13	16	14	25.3	15

a/ U. S. Department of Agriculture, Food Consumption of Households in the United States, Household Food Consumption Survey 1955, Reports 1-5; and Agricultural Marketing Service, The National Food Situation, NFS-79, 80, 84, and 90.

b/ Data calculated by multiplying regional population levels by estimated regional per capita consumption levels. The regional per capita consumption levels were obtained by applying relative regional consumption rates to United States apparent civilian per capita consumption levels for 1958 as reported in Agricultural Marketing Service, The National Food Situation, NFS-91, p. 4. The U.S. consumption levels are as follows: beef and veal (carcass weight) = 87.2 pounds; pork, excluding lard (carcass weight) = 60.7 pounds; chicken (ready-to-cook) = 28.3 pounds; eggs (farm basis) = 349, milk fat solids = 26.2 pounds.

c/ Milk fat solids basis.

TABLE 4

Regional Production of Major Livestock Products, 1958, Expressed as a Percentage of United States Production, and as a Percentage of Regional Consumption

Region	Regional production expressed as a percentage of United States total					Regional production expressed as a percentage of regional consumption f/					
	cattle and calves a/	hogs b/	chicken c/	eggs d/	dairy products e/	cattle and calves	hogs	chicken	eggs	dairy products g/ total	dairy products g/ fluid milk h/
	percent					percent				percent	
U.S.	100	100	100	100	100	100	100	100	100	96	231
Northeast	4	2	22	19	19	14	8	73	74	67	127
No. Cent.	49	79	20	47	50	144	250	70	158	153	333
South	28	17	52	21	19	146	53	180	72	86	262
West	19	2	6	13	12	105	17	49	84	89	231

a/ Agricultural Marketing Service, Meat Animals, Mt An 1-1 59.

b/ See Table 19.

c/ Production of broilers (Table 25); farm chicken (Table 23); plus an allowance for cull layers based on the regional average number of layers so as to balance total production level with consumption level.

d/ See Table 21.

e/ Data on milk fat solids basis as reported by Agricultural Marketing Service, Milk, Farm Production Disposition and Income 1958-59, Da 1-2 (60).

f/ Consumption levels converted to liveweight equivalent using the following conversion factors: beef and veal (.549); hogs, (.569); and chicken, ready-to-cook, (.66). The production levels of items other than milk were adjusted by 1-3 percent to the consumption levels for purposes of this comparison. Milk was not adjusted to allow for quantity fed to calves of 2.5 percent.

g/ Milk fat solids basis.

h/ Estimate based on the United States per capita consumption of fresh whole milk of 298 pounds converted to fat solids (3.97 percent).

was concentrated in the South with 52 precent of the United States production. The West is an important range area for livestock production and accounted for 19 percent of production. In the Northeast, chickens, eggs, and market milk are the principal livestock products produced.

The deficit or surplus position of regions in the production of individual livestock products can be seen by expressing regional production as a percentage of regional consumption (see Table 4). The major surplus producing areas for cattle and calves are the South and North Central regions, with the Northeast the major deficit area. Hog production is centered in the Corn Belt with the whole North Central region producing 2.5 times its consumption needs. All other areas are deficit, especially the Northeast and West. Chicken production in the South exceeds consumption needs by 80 percent. The commercial broiler industry growth in this area is well known. In egg production and production of dairy products, the North Central region produces about 1.5 times its consumption needs. The deficits in other areas for these items in general are relatively less than for meat production. The reasons for these production-consumption balances are discussed briefly in the following section.

Factors Affecting Regional Composition of Livestock Production

A complete explanation of location of various livestock products would require a complex analysis of interregional competition which is far beyond the scope of this report. However, it is possible to discuss certain of the key factors which affect the regional composition of livestock production. These factors include those relating to regional demand, regional supply of factors and product, and transfer costs for factor and product. Spatial equilibrium models, relating these factors, have been developed for individual livestock

products, illustrated by the work of Judge and Wallace[1] for beef and pork; Judge[2] for eggs; Henry and Bishop[3] for broilers; and Snodgrass and French[4] for milk. A model of the aggregate feed-livestock economy has been reported by Fox and Taeuber.[5]

Here we will be interested in a less elaborate analysis, namely: What is the ranking of livestock products as to raw material source vs. market orientation of production? Such a ranking will provide insight as to the use of feed among alternative livestock categories, especially in feed deficit areas. The basic information required includes: (1) feed requirements per 100 pounds of final product; and (2) relative transportation costs for final product and for feed inputs such as concentrates and roughage.

For this comparison, we will be concerned with production of pork, chicken, eggs, and milk.[6] Concentrate feeds will be considered the only input, assuming roughage for milk production is not shipped interregionally.[7] Assume

---

[1] Judge, G. G., and T. W. Wallace, Spatial Equilibrium Analyses of the Livestock Economy, 1. Methodological Development and Annual Spatial Analyses of the Beef Marketing Sector, Oklahoma Agr. Expt. Sta. Tech. Bul. T-75, 1958 and 3. Spatial Price Equilibrium Models of the Pork Marketing System, Oklahoma Agr. Expt. Sta. Tech. Bul. T-81, 1960.

[2] Judge, G. G., Competitive Position of the Connecticut Poultry Industry, 7. A Spatial Equilibrium Model for Eggs, Connecticut Agr. Expt. Sta. Bul. 318, 1956.

[3] Henry, W. R., and C. E. Bishop, North Carolina Broilers in Interregional Competition, North Carolina State, A.E. Inf. Series No. 56, 1957.

[4] Snodgrass, M. M., and C. E. French, Linear Programming Approach to the Study of Interregional Competition in Dairying, Indiana Agr. Expt. Sta., S.B. 637, 1958.

[5] Fox, K. A., and R. C. Taeuber, "Spatial Equilibrium Models of the Livestock-Feed Economy," The American Economic Review, Vol. 45, No. 4, Sept. 1955, pp. 584-608.

[6] The orientation of fed beef cattle is not considered here since there are three inputs which may be shipped--feeder cattle, concentrates, and roughage. The location of feeding is the subject of an unpublished thesis by Lee F. Schrader, A Spatial Equilibrium Analysis of Cattle Feeding in the United States, University of California, 1961. It should be noted that milk production is similar with replacement heifers, concentrates, and roughage as mobile factors.

[7] This simplifying assumption is not entirely realistic since hay is shipped between regions to some limited extent.

further that transfer functions for product and factors increase at a decreasing rate with distance. This is a realistic assumption in line with current rate structures. Under the conditions specified we want to compare the following ratios for each product:

$$\overset{A}{\frac{\text{pounds concentrate feed required}}{\text{100 pounds product}}} \quad \overset{<}{>} \quad \overset{B}{\frac{\text{transfer cost per 100 pounds product}}{\text{transfer cost per 100 pounds concentrates}}}$$

Livestock production is a weight-losing process, in that the tonnage of inputs is more than the tonnage of product. However, the amount of feed required per 100 pounds of product varies considerably among the various livestock products. In general, production tends to be oriented to the raw material source, but this is true only if ratio A (pounds of feed per 100 pounds of product) is greater than ratio B (the relative transfer costs for product and material). If ratio A equals B, then it is a matter of indifference as to whether production occurs at the market or raw material site (i.e., pounds of concentrate feed required per 100 pounds of products x transfer cost/100 pounds feed = 100 pounds product x transfer cost/100 pounds product).

Table 5 summarizes the above calculations for the major livestock products. The ranking of major livestock products as to the degree of feed-source orientation would be as follows:

	Ratio		
	A		B
fresh pork	9.1	>	3.7
live hogs	5.2	>	2.3
butter	6.8	>	3.5
broilers	3.9	>	3.6
eggs, shipments of 500 miles	4.2	>	3.9
shipments of 1,000 miles		<	5.2
fluid milk	0.3	<	2.8

Pork production is highly feed-source oriented especially for shipment of processed products. Milk products range from feed-source orientation of the processed items to market orientation of fluid milk. It is noted that the concentrate requirement of 32 pounds per 100 pounds of milk assumes an adequate roughage supply in the area. Broiler production would tend to be slightly feed-source

TABLE 5

Comparison of Feed Requirements Per 100 Pounds of Product with Relative Transfer Costs for Feed and Product

Item	Conversion factor prod. wt./primary wt.	Feed required per 100 lbs. of prod. a/	Ratio A feed/100 lbs. prod./100		Ratio B transfer costs b/ 100 lbs. prod./100 lbs. corn		
					miles		
					500	1,000	1,500
	percent	pounds	ratio			ratio	
Hogs, live	100	519	5.2	>	2.5	2.3	2.3
fresh pork	57	910	9.1	>	3.6	3.7	3.8
Milk, fluid	100	32	.3	<	2.8	3.4	3.8
butter	4.7	675	6.8	>	3.7	3.5	3.5
Broilers, live	100	257	2.6		--	--	--
ready-to-cook	66	389	3.9	>	3.7	3.6	3.5
Eggs, fresh	100	416	4.2	>	3.9	5.2	6.3
Feedlot cattle	100	245 c/	2.5	>	2.4	2.2	2.2
carcass beef	55	445	4.5	>	3.1	3.0	3.0

a/ Hogs; (see Table 19); Milk, (see Table 11); Broilers, (see Table 25); Eggs, (see Table 21).

b/ Ratios relate to 1958 rates. The rate for cattle and meat, is as reported by Schrader, op. cit.; the rates for butter, milk, broilers, eggs, and pork were taken from sources to be noted and adjusted to the 1958 level using the annual rail freight rate index for meat as reported in Agricultural Marketing Service The Marketing and Transportation Situation, MTS-134, July 1959; the rate for butter and milk is based on data reported by Snodgrass and French, op. cit.; broilers, Henry and Bishop, op. cit.; eggs, Judge, op. cit.; and pork, Wallace and Judge, op. cit.

c/ Feedlot cattle, assuming a 650 pound feeder steer fed to 1,000 pounds, using 7 pounds of feed per pound of gain, or 2,450 pounds. This figure does not include concentrates fed prior to 650 pound weight. This comparison is not particularly useful since the location of feeder cattle is an important factor in location of feeding. See Schrader, op. cit.

oriented, although to a much less extent than pork, for example. As noted previously, other factors are of vital importance in location such as market location, perishability of product, and relative costs of factors other than concentrate feed, such as labor. Egg production would tend to be feed-source oriented for relatively short shipments of fresh eggs, but the reverse is true for shipments of 1,000 miles or more. This case illustrates the effect of differing relative rates for product and factor in interregional competition. The data relating to feedlot cattle are not particularly useful since the source of feeder cattle is an important aspect in location of feeding.

The regional composition of livestock production would tend to reflect the region's position as to consumer demand in relation to feed supplies and other production conditions. If regional production is expressed as a percent of consumption for various livestock products we may gain some insight as to the production pattern by regions. These data are shown in Table 6 with regions grouped according to the feed balance (i.e., whether or not quantity fed exceeds production). The level of consumption was estimated by applying the appropriate regional per capita consumption level, based on the 1955 Survey data, to the sub-region population level. This provides only a rough guide to the consumption level in the sub-region, ignoring income effects, preferences, and other important variables.

Hog production is centered in the major feed surplus area as would be expected based on high feed requirements and favorable shipment costs especially for the processed products.

Milk production must be considered as that for fresh fluid consumption and for use in manufactured products. Fresh milk is highly market-oriented with feed deficit areas producing more than enough for this use. Production of total milk in relation to total consumption provides a measure of the relative deficit position of areas such as the Northeast and California which also are deficit in feed supplies. The only feed deficit area with surplus milk production is region

TABLE 6

Production-Consumption Balance for Major Livestock Products, for Sub-Regions Grouped According to Feed Balance, 1958

Regions, major areas and grouped as to feed balance	Production expressed as a percentage of consumption, by type of livestock product					
		milk products				
	pork	total	fluid milk	chicken	eggs	beef and veal
	percent					
Major regions:						
Northeast	8	67	127	73	74	14
North Central	250	153	333	70	158	143
South	53	86	262	180	72	146
West	17	89	172	49	84	105
Sub-regions grouped as to feed balance: [a]						
Quantity fed exceeds production:						
Northeast (18)	8	67	127	73	74	14
South (excl. 12)						
Va., N.C., S.C., Ga. (19)	68	75	227	285	85	65
Ark., La., Miss., Ala. (15)	50	91	277	277	67	174
W. Va., Ky. Tenn. (17)	76	136	413	89	73	113
Florida (20)	18	49	148	28	41	76
California (2+3)	8	75	228	51	90	40
Production exceeds quantity fed:						
North Central						
Iowa, Ill., Mo. (14)	413	110	240	71	168	158
Nebr., Kan. (11)	282	142	308	94	286	442
N. Dak., S. Dak. (10)	505	287	622	144	422	716
Mich., Ind., Ohio (16)	100	82	179	51	83	43
Minn., Wisc. (13)	257	447	978	96	247	162
Oklahoma-Texas (12)	32	75	228	90	73	276
Mountain states						
Mont., Wyo. (7), Col. (8)	45	81	160	27	61	364
Other (4) (5) (6) (9)	23	115	223	31	63	195
Wash., Ore. (1)	23	107	205	69	95	85

[a] The classification of regions as to feed balance is that shown in Table 1.

17 (W. Va., Ky., Tenn.) which supplies important nearby consumption centers. The major surplus-producing area is region 13 (Minn.-Wisc.).

Commercial broiler production in 1958 of 5.4 billion pounds accounts for over 70 percent of estimated total chicken production of 7.6 billion pounds.[1] Regions 15 and 19 in the South are the major surplus producing areas, accounting for 51 percent of 1958 commercial broiler meat production. The Northeast (Region 18) produced 23 percent of United States production, but was on a net deficit basis for all chicken meat. Large amounts of feed move into all three of these regions. Water shipments from the Corn Belt are important for the Southern production region. The degree of feed-source orientation in broiler production is less than that for hogs or manufactured milk. If water shipment rates rather than rail rates are applicable, the relationship shown in Table 5 might well be reversed for some areas. The present location of the industry has been influenced by such factors as feeding efficiency, labor costs, and financial arrangements in an integrated industry.

Egg production is less concentrated than broiler production. The North Central region is the major supply area for shipments to other regions. Not all shipments are as fresh eggs, however, as liquid, frozen, and dried egg production accounts for about 7 percent of total egg production.[2] The feed-orientation for shipment of processed eggs from areas such as the North Central states clearly would be greater than for fresh egg shipment. The demand for fresh eggs from local sources has been such as to encourage production of eggs in areas like the Northeast. The data shown in Table 5 on the transportation cost ratio for feed shipments by rail and egg movement by truck indicate a shift in feed vs. market-orientation between a shipment of 500 miles and 1,000 miles. According to Judge[3]

---

[1] Estimated from reported production, including nonfarm, of chicken (ready-to-cook) of 5,026 million pounds, converted to liveweight assuming a conversion factor of .66: see Agricultural Marketing Service, The National Food Situation, NFS-90, p. 29.

[2] Gerra, M. J., The Demand, Supply, and Price Structure for Eggs, U.S. Department of Agriculture Tech. Bul. 1204, 1959, p. 10.

[3] Judge, op. cit., p. 12.

about 95 percent of eggs moved are transported by truck, and so this rate comparison appears valid. Thus, the location of egg production, as with other products, depends on the regional demand and supply conditions as well as the transportation costs noted.

Feedlot cattle production involves consideration of the location of feeder cattle supplies, feed concentrates, and hay. Since all items may be shipped, a fairly complex relationship is specified. The type of comparison possible by the present simple comparison of ratios does not allow for factors involved in feeder cattle shipments, which can be a decisive consideration. However, there is a tendency for production to be feed-source oriented, especially for shipments of carcass meat.

In summary, the regional composition of livestock production and use of feed depends on a complex set of interrelated supply factors; on regional demand for various livestock products; and on transfer costs for product and factors of production. A rough measure of the feed production orientation of various livestock products is obtained by comparing feed concentrate requirements per 100 pounds of product with the relative transfer costs for feed and product. Such a ranking of major livestock products as to the degree of feed-source orientation is as follows: fresh pork, live hogs, butter, broilers, eggs, and fluid milk. For a feed deficit state such as California, the implications as to the regional composition of livestock production for the future would be that available feed would be used for production of such products as fluid milk and eggs, whereas competition from surplus feed producing areas such as the corn belt would be especially strong for products such as pork, a product highly feed-source oriented.

ESTIMATION OF REGIONAL SUPPLY AND DISTRIBUTION OF FEED

General Approach

The year beginning October 1, 1957 was selected for analysis since it was the most recent year for which feed rail and water shipments data were readil available. The general approach to the study of feed supply and distribution follows that of R. D. Jennings.[1] However, no attempt was made to obtain a detailed breakdown by individual states, nor to account for quantities of feed used in the manufacture of formula feeds. Perhaps a useful feature of the present report is that sources of data and methods employed in estimating feeding rates, for example, are fully noted.

Details of the methods used in obtaining the regional supply and distribution of feeds will be noted in subsequent sections. Briefly, the approach was to obtain a balance between reported quantities of feeds fed and numbers of livestock, by kind, for the United States. Feeding rates were established for various kinds of livestock, considering such factors as average liveweight of slaughter, or production per animal. Regional differences in feeding rates, in general, reflect only differences in the production per animal. Numbers of livestock, by region, were then used to obtain the level of feed consumed by livestock in the 19 regions.

Data on feed production, stocks, industrial and other non-feed uses were obtained by region. Rail shipments, imports, exports, and water shipments were summarized for the principal feeds. These data were then combined with othe supply and distribution data (see Table 7). The difference between estimated feeds fed and available supplies was assumed to result from "other" shipments. Truck shipments probably account for a large share of these shipments, in additio to water and rail shipments of byproduct feeds such as molasses. Truck shipments of feed grains are reported for California, for example, and account for at least

---

[1] Jennings, R. D., op. cit.

TABLE 7

Feed Concentrates: Supply and Distribution, by Regions, in Thousands of Tons, Year Beginning October 1, 1957

	Supply						Distribution							
				net inshipments							net outshipments			
Region	stocks Oct. 1, 1957	production a/	imports	rail and water	other b/	total supply	stocks Oct. 1, 1958	farm food and seed	industrial & food uses	exports	rail and water	other b/	corn fed not as grain	concentrates fed
1	2,133	2,111	75	1,640	--	5,959	2,036	81	54	1,161	--	759	70	1,798
2&3	1,568	4,069	305	1,638	542c/	8,122	1,881	111	249	654	--	--	150	5,077
4	20	43	--	36	69	168	45	1	--	--	--	--	5	117
5	811	1,486	--	--	382	2,679	877	42	35	--	314	--	147	1,264
6	184	584	--	7	32	807	207	13	--	--	--	--	10	577
7	1,569	1,904	--	--	278	3,751	1,883	70	2	--	850	--	134	812
8	549	2,025	--	--	--	2,574	553	36	2	--	147	325	338	1,173
9	49	303	--	--	8	360	78	4	--	--	3	--	20	255
10	7,025	11,219	--	--	--	18,244	8,957	376	44	--	2,940	489	792	4,646
11	6,198	16,944	--	--	--	23,142	8,663	176	149	--	5,365	537	447	7,805
12	3,195	11,892	307	1,910	--	17,304	6,523	206	507	2,647	--	1,960	58	5,403
13	11,814	22,403	292	--	821	35,330	12,816	381	1,468	148	3,123	--	2,539	14,855
14	26,350	51,317	72	--	93	77,832	27,670	527	4,348	391	7,682	--	1,444	35,770
15	619	5,589	452	4,505	--	11,165	565	146	273	2,791	--	625	220	6,545
16	5,835	20,978	134	--	--	26,947	6,800	176	1,478	420	1,519	998	1,068	14,488
17	576	4,853	--	746	488	6,663	463	61	611	--	--	--	173	5,355
18	2,682	6,712	545	8,328	783	19,050	2,597	103	745	1,514	--	--	1,413	12,678
19	894	6,734	155	2,735	1,792	12,310	716	185	304	864	--	--	612	9,629
20	16	586	114	398	405	1,519	21	12	4	33	--	--	144	1,305
United States	72,087	171,752	2,451	(21,943)	(5,693)	246,290d/	83,351	2,707	10,273	10,623	(21,943)	(5,693)	9,784	129,552

(Continued on next page.)

Table 7 continued.

a/ Includes wheat and rye fed of 1.6 million tons.

b/ Residual based on difference between supplies and estimated concentrates fed. Truck shipments probably account for a large share of these shipments, as well as water and rail shipments of molasses and other byproducts. Also, shipments data relate to calendar year 1958 whereas concentrates fed are estimates for the year beginning October 1957. Errors in feeding rates are also reflected in these data.

c/ Truck shipments of the four feed grains into California equaled 342 thousand tons for the year beginning October 1, 1957.

d/ This figure differs from the sum of the regional supplies by the amount of inter-regional shipments (i.e., net inshipments of 27,636,000 tons).

Source: Data used in this summary table will be found in Tables 30 - 47.

342 thousand tons of the 542 thousand tons of "other" shipments shown in Table 7. However, "other" shipments must be considered as a residual that reflects errors in the feeding rates, in the reported shipments data, as well as the unreported truck shipments data for most regions. Also, shipments data relate to the calendar year 1958 whereas feed consumption is for the year beginning October 1, 1957.

Concentrates fed to animals, by region, is given in Table 8. These data summarize the detailed calculations on animal numbers, production, and feeding rates found in Tables 11-29. The regional distribution of concentrates fed to other livestock such as ducks, geese, and livestock not on farms is based on data given by Jennings.[1] A detailed breakdown of the California feed supply and use by various kinds of livestock is given in Tables 9 and 10.

Livestock Numbers, Production, and Feeding Rates

Livestock numbers are readily available, by state, in the Agricultural Marketing Service reports on inventory numbers as of January first.[2] In this study, January 1, 1958 data were used. Production data also were compiled, relating insofar as possible to the year beginning October 1, 1957, for milk cows, hogs, laying hens, farm chickens, broilers, turkeys, and for marketings of grain fattened beef cattle. For sheep, separate livestock numbers were developed for stock sheep and sheep grain fattened. Inventory numbers only were developed for other dairy cattle, beef cattle other than on feed January first, and for horses and mules.

Feeding rates were developed using several sources of data and may well be subject to significant error. Although the detailed explanation of these rates accompanies each of the tables on regional estimates of feed consumed for each of the kinds of livestock, it may be useful to outline breifly the methods used in deriving these data.

---

[1] Jennings, R. D., Feed Consumed by Livestock..., op. cit.

[2] Detailed citations as to sources are given in footnotes to Tables 11-29 and therefore will not be repeated in the text.

TABLE 8

Concentrates Fed to Animals, by Regions, in Thousands of Tons, Year Beginning October 1, 1957

Region	Milk cows	Other dairy cattle	Cattle grain fat-tened	Other beef cattle	Stock sheep	Sheep grain fat-tened	Hogs	Laying chick-ens	Farm chick-ens	Broil-ers	Tur-keys	Horses and mules	Other live-stock	Total fed to animals
1	400	47	174	86	10	4	252	394	105	100	106	16	104	1,798
2 & 3	971	87	1,044	96	15	20	276	1,125	300	202	648	6	287	5,077
4	9	3	46	26	4	1	15	5	2	--	--	2	4	117
5	248	36	296	68	21	11	154	172	54	19	148	7	30	1,264
6	48	5	393	33	4	2	23	27	10	2	5	5	20	577
7	90	12	174	157	33	20	158	81	37	--	1	28	21	812
8	125	15	526	77	11	39	144	80	25	5	68	22	36	1,173
9	32	3	53	47	11	3	31	32	4	--	4	19	16	255
10	490	128	635	366	49	29	2,108	522	197	--	59	44	19	4,646
11	650	144	1,630	693	21	53	3,128	939	320	17	90	46	74	7,805
12	1,047	101	336	544	44	18	1,181	869	201	447	207	148	260	5,403
13	4,019	858	953	270	36	21	5,819	1,582	493	100	493	58	153	14,855
14	2,546	450	4,588	1,538	91	60	21,853	2,626	849	189	496	109	375	35,770
15	1,064	141	100	490	9	1	1,579	774	204	1,426	128	429	200	6,545
16	2,303	481	1,092	440	71	29	6,664	1,724	523	315	308	59	479	14,488
17	1,039	188	85	199	33	--	2,022	703	201	317	64	328	176	5,355
18	3,739	645	156	108	16	2	892	3,033	867	1,711	174	114	1,221	12,678
19	1,025	206	112	243	13	--	3,013	1,324	505	2,067	301	538	282	9,629
20	419	50	42	149	--	--	254	173	47	44	10	35	82	1,305
United States	20,264	3,600	12,435	5,630	492	313	49,566	16,185	4,944	6,961	3,310	2,013	3,839	129,552

TABLE 9

California: Estimated Concentrates Fed Per Head or Per Production Unit, and Total Fed, Year Beginning October 1, 1957

Item	Number Jan. 1, 1958	Est. of no. fed in Oct.-Sept.	Production		Avg. production per animal		Average weight	Concentrates fed per head	Concentrates fed per 100 units of production	Concentrates fed Total
	1,000 head		millions of units	amount	unit	amount	pounds			1,000 tons
Dairy cattle										
Milk cows	945	--	lbs.	7,612	--	--	--	2,055	26	971
Dairy heifers 1-2 yrs.	254	--	--	--	--	--	--	200	--	25
Heifer calves	276	--	--	--	--	--	--	390	--	54
Dairy bulls	44	--	--	--	--	--	--	350	--	8
Beef cattle										
Cows 2 yrs. old and older	809	--	--	--	--	--	--	75	--	30
Bulls	31	--	--	--	--	--	--	165	--	3
Beef cattle grain fattened[a]	398	1,331	--	--	--	--	--	--	--	1,044
Other 1-2 yrs.	--	--	--	--	--	--	--	--	--	--
Heifers 1-2 yrs.	326	--	--	--	--	--	--	--	--	--
Steers 1 yr. and older	602	--	--	--	--	--	--	--	--	--
Calves	444	--	--	--	--	--	--	--	--	--
Total[b]	1,372	--	--	--	--	--	--	--	--	--
Total; less fed cattle and calves on feed January 1[c]	--	974	--	--	--	--	--	130	--	63
Sheep										
Stock sheep	1,616	--	--	--	--	--	--	18	--	15
Sheep grain fattened	250	312	--	--	--	--	--	125	--	20
Hogs	--	540	lbs.	106	lbs.	236	236	1,022	520	276
Poultry										
Laying chickens	24,904	21,424	eggs	4,807	eggs	224	4.5	105	--	1,125
Farm chickens	--	28,615	lbs.	89.4	lbs.	3.12	3.12	21	--	300
Broilers	--	47,839	lbs.	157.9	lbs.	3.30	3.30	8.46	--	202
Turkeys	--	13,639	lbs.	255.2	lbs.	18.8	18.8	95	--	648
Horses and mules	65	--	--	--	--	--	--	191	--	6
Other livestock	--	--	--	--	--	--	--	--	--	287
Total	--	--	--	--	--	--	--	--	--	5,077

(Continued on next page)

Table 9 **continued.**

a/ Feed fed to cattle grain fattened determined as follows:

Average number of days on feed	Weight gain per day	Calculated weight gain		Concentrates fed per pound of gain
		per head	total	
number	pounds	pounds	tons	pounds
102	2.2	224	149,072	7

b/ Sum of beef heifers, steers, and calves.

c/ Total "other beef cattle" minus cattle and calves on feed January 1, 1958 (1,372-398 = 974).

[illegible]

[illegible]

[illegible]
[illegible]

[illegible]

[illegible]

TABLE 10

California: Feed Supply and Distribution, Year Beginning October 1, 1957

Row	Item	Supply						Distribution							
					net inshpts.								net outshpts.		
		stocks Oct.1, 1957	production	imports	rail & water	other a/	total supply	stocks Oct. 1, 1958	farm food and seed	industrial & food uses	exports	corn not harvested as grain	rail & water	other	concentrates fed
							1,000 Tons								
1	Feed grains:														
2	Corn	55	537	--	121	40	753	63	2	153	96	150	--	--	279
3	Oats	70	97	--	2	24	193	77	22	46	--	--	--	--	48
4	Barley	1,355	1,620	--	26	40	3,041	1,147	85	47	480	--	--	--	1,322
5	Sorghum	26	370	--	1,198	280	1,874	572	2	3	65	--	--	--	1,202
6	Total	1,506	2,624	--	1,347	384	5,861	1,859	111	249	641	150	--	--	2,851
7	Wheat and rye fed	--	14	--	--	--	14	--	--	--	--	--	--	--	14
8	By-products:														
9	High protein feeds:														
10	Soybean meal	1	62	--	120	20	203	--	--	--	--	--	--	--	203
11	Cottonseed meal	50	279	12	--	26	367	7	--	--	--	--	13	--	347
12	Linseed meal	5	30	--	3	--	38	3	--	--	--	--	--	--	35
13	Peanut meal	--	--	--	--	--	--	--	--	--	--	--	--	--	--
14	Copra	--	107	60	--	--	167	--	--	--	--	--	--	--	167
15	Meat scraps and tankage	--	115	--	--	--	116	--	--	--	--	--	--	--	116
16	Fish by-products	--	50	15	--	--	65	--	--	--	--	--	--	--	65
17	Comm'l. dried milk products	--	6	--	--	--	6	--	--	--	--	--	--	--	6
18	Non-comm'l. milk products	--	50	--	--	--	50	--	--	--	--	--	--	--	50
19	Corn gluten feed	--	3	--	--	--	3	--	--	--	--	--	--	--	3
20	Brewers dried grains	--	19	--	--	--	19	--	--	--	--	--	--	--	19
21	Distillers dried grains	--	9	--	--	--	9	--	--	--	--	--	--	--	9
22	Total high protein feeds	56	731	87	123	46	1,043	10	--	--	--	--	13	--	1,020
23	Other feeds:														
24	Wheat mill feeds	--	114	--	141	59	314	--	--	--	--	--	--	--	314
25	Rice mill feeds	--	55	--	--	--	55	--	--	--	--	--	--	--	55
26	Dried & molasses beet pulp	--	183	--	--	--	183	--	--	--	--	--	--	--	183
27	Alfalfa meal	6	187	--	--	7	200	12	--	--	--	--	--	--	188
28	Rye mill feeds	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29	Hominy	--	23	--	--	--	23	--	--	--	--	--	--	--	23
30	Oat mill feeds	--	25	--	--	--	25	--	--	--	--	--	--	--	25
31	Molasses	--	102	166	--	46	314	--	--	--	--	--	--	--	314
32	Screenings	--	11	--	--	--	11	--	--	--	--	--	--	--	11
33	Total other feeds	6	700	166	141	112	1,125	12	--	--	--	--	--	--	1,113
34	Formula feeds	--	--	52	40	--	92	--	--	--	13	--	--	--	79
35	Total livestock feed	1,568	4,069	305	1,651	542	8,135	1,881	111	249	654	150	13	--	5,077

a/ Truck inshipments into California for the year beginning October 1, 1957 were as follows: corn, 34,702 tons; oats, 22,078 tons; barley, 33,264 tons; sorghum, 251,864 tons; with total of these grains equaling 341,908 tons. All figures shown in this column are rough estimates.

TABLE 11

Milk Cows: Number, Production, and Concentrates Fed, by Region, Year Beginning October 1, 1957

Region	Number of milk cows, Jan. 1, 1958 a/	Milk production, Oct. 1957-Sept. 1958 b/	Concentrates fed			
			total		per head Jan. 1 e/	per 100# of milk e/
			reported c/	adjusted d/		
	1,000 head	million pounds	1,000 tons		pounds	
1	508	3,023	391	400	1,575	26
2 & 3	945	7,612	949	971	2,055	26
4	17	98	9	9	1,059	18
5	350	2,301	242	248	1,417	22
6	52	415	47	48	1,846	23
7	138	706	88	90	1,304	25
8	153	850	122	125	1,634	29
9	50	232	31	32	1,280	28
10	699	3,220	479	490	1,402	30
11	888	4,107	636	650	1,464	32
12	1,184	4,562	1,023	1,047	1,769	46
13	4,012	27,739	3,929	4,019	2,003	29
14	2,708	14,984	2,489	2,546	1,880	34
15	1,622	4,478	1,040	1,064	1,312	48
16	2,297	14,441	2,251	2,303	2,005	32
17	1,486	5,744	1,016	1,039	1,398	36
18	3,607	23,705	3,655	3,739	2,073	32
19	1,294	5,540	1,002	1,025	1,584	37
20	223	1,126	410	419	3,758	74
United States	22,233	124,883	19,809	20,264	1,823	32

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Lv. Gn. 1 (59). Data refer to cows and heifers 2 years old and older kept for milk.

b/ Agricultural Marketing Service, Milk Production, Da. 1-1 (2-59).

c/ Agricultural Marketing Service, Milk Production, Da. 1-1 (3-59).

d/ Adjusted to account for feed consumed by heifers 2 years old and older, not fresh. The average number of such animals is estimated at 1,500,000 head with concentrates fed of 600 pounds per head as reported by American Feed Manufacturers Association, Estimated Feed Use and Supplies for Feeding Year Beginning October 1, 1957, Chicago, 1957. The level of concentrates fed to milk cows of 2,003 pounds per head (given in Milk Production) is at a higher level and refers to fewer animals than these data on feeding rates per head which relate to milk cows plus heifers 2 years old and over, not fresh, as of January 1.

e/ Calculated using adjusted concentrates fed and the relevant data as shown in the table.

TABLE 12

Other Dairy Cattle: Number and Concentrates Fed, by Region, Year Beginning October 1, 1957

	Number, January 1, 1958				Concentrates fed			
					per head c/			
Region	dairy heifers 1-2 yrs.a/	heifer calves a/	dairy bulls b/	total	dairy heifers	heifer calves	dairy bulls	total
	1,000 head				pounds			1,000 tons
1	128	155	22	305	200	390	350	47
2&3	254	276	44	574	200	390	350	87
4	9	10	1	20	200	390	350	3
5	102	121	12	235	200	390	350	36
6	15	17	2	34	200	390	350	5
7	31	40	6	77	200	390	350	12
8	38	49	7	94	200	390	350	15
9	9	12	2	23	200	390	350	3
10	155	224	30	409	405	775	700	128
11	205	233	35	473	405	775	700	144
12	270	337	48	655	200	390	350	101
13	1,054	1,076	96	2,226	511	1,005	988	858
14	641	737	98	1,476	405	775	700	450
15	397	471	49	917	200	390	350	141
16	571	606	63	1,240	511	1,005	988	481
17	276	302	43	621	405	775	700	188
18	777	801	90	1,668	511	1,005	988	645
19	290	335	49	674	405	775	700	206
20	75	81	11	167	405	775	700	50
United States	5,297	5,883	708	11,888	405	775	700	3,600

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Washington, Lv. Gn. 1 (59).

b/ Inventory data do not indicate numbers of dairy and beef bulls separately. Numbers were allocated by state in proportion to the number of cows 2 years old and older that are dairy cows or beef cows. The figure for the United States is the sum of individual state estimates.

c/ Feeding rates for the United States are approximately equal to those reported in: American Feed Manufacturers Association, Estimated Feed Use and Supplies for Feeding Year Beginning October 1, 1957, Chicago, 1957. The rate for heifer calves includes an allowance for the dry weight equivalent of milk fed to calves of 175 pounds. The feeding rates for range areas of the Western Region (regions 1 through 9) plus Oklahoma and Texas (region 12) and for Louisiana, Mississippi, Arkansas, and Alabama (region 15) are assumed to equal 50 percent of the United States average. The feeding rates in the Corn Belt and Lake States (regions 13, 14, 16) are assumed to be higher than the United States average.

TABLE 13

Beef Cows, Bulls and Other: Number and Concentrates Fed, by Region, Year Beginning October 1, 1957

	Number on farms January 1, 1958[a]							Concentrates fed			
			other					Per head[c]			
Region	beef cows 2 yrs. and older	beef bulls	heifers 1 - 2 years	steers 1 year and older	calves	total	total less fed cattle & calves on feed Jan.1[b]	beef cows	beef bulls	other	total[f]
	1,000 head							pounds			1,000 tons
1	723	31	207	210	539	956	874	75	165	130	86
2&3	809	38	326	602	444	1,372	974	75	165	130	96
4	294	12	68	31	143	242	214	75	165	130	26
5	618	20	167	225	451	843	669	75	165	130	68
6	367	17	92	191	190	473	283	75	165	130	33
7	1,616	69	282	192	1,013	1,487	1,384	75	165	130	157
8	704	35	285	188	520	993	742	75	165	130	77
9	581	20	84	37	261	382	349	75	165	130	47
10	1,805	79	350	408	1,350	2,108	1,744	150	325	250	366
11	2,457	94	703	1,266	2,710	4,679	3,956	150	325	250	693
12	4,796	198	760	710	2,391	3,861	3,698	120	165	130	544
13	366	10	211	555	689	1,455	973	328	600	425	270
14	2,483	90	860	2,692	3,858	7,410	5,185	328	600	425	1,538
15	2,967	90	597	334	1,182	2,113	2,023	150	325	250	490
16	663	18	303	731	1,075	2,109	1,536	328	600	425	440
17	799	24	241	313	605	1,159	1,083	150	325	250	199
18	199	5	67	232	127	426	348	328	600	425	108
19	1,220	49	313	264	669	1,246	1,146	150	325	250	243
20	815	41	147	267	274	688	650	150	325	250	149
United States	24,287	940	6,063	9,448	18,491	34,002	27,831	150	290	260	5,630

(Continued on next page.)

Table 13 continued.

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Lv. Gn. 1 (59).

b/ Calculated by subtracting the number of fed cattle and calves on feed January 1, 1958 (as shown in Table) from the January 1, 1958, inventory of heifers 1-2 years, steers, 1 year and older, and calves.

c/ Preliminary. The United States average feeding rates are based mainly on data given in: American Feed Manufacturers Association, Estimated Feed Concentrates Fed in the Year Beginning October 1, 1957, Chicago, 1957. These reported feeding rates are: beef cows (150 pounds); beef bulls (325 pounds); heifer replacements (205 pounds); steers wintered (185 pounds); calf replacements (290 pounds). The average feeding rate for "other" beef cattle is a weighted average for cattle not on feed on January 1 and considers feeding rates noted above for heifer replacements, calf replacements, and steers wintered. Regional feeding rates are considered very rough estimates. The feeding rates for the Western range areas (regions 1-9) are assumed to equal approximately 50 percent of the United States average. These feeding rates are assumed also for region 12 for beef bulls and "other" beef cattle, with the feeding rate for beef cows equal to 80 percent of the United States average. The feeding rate for beef cattle in the Corn Belt, Lake States, and the northeast is assumed to be higher than the United States average, as indicated in the table.

TABLE 14

Beef Cattle Grain Fattened: Number Marketed, Estimated Number of Days on Feed, Assumed Weight Gain Per Day, Calculated Weight Gain, and Estimated Concentrates Fed, Year Beginning October 1, 1957

Region	No. of fed cattle and calves marketed[a]	Average number of days on feed[a]	Assumed weight gain per day[b]	Calculated weight gain[c]		Concentrates fed	
				per head	total	per pound of gain[d]	Total
	1,000 head	days	pounds	pounds	tons	pounds	1,000 tons
1	151	150	2.2	330	24,915	7	174
2&3	1,331	102	2.2	224	149,072	7	1,044
4	52	115	2.2	253	6,578	7	46
5	283	136	2.2	299	42,309	7	296
6	398	128	2.2	282	56,118	7	393
7	150	151	2.2	332	24,900	7	174
8	477	143	2.2	315	75,128	7	526
9	61	113	2.2	249	7,595	7	53
10	518	159	2.2	350	90,650	7	635
11	1,579	134	2.2	295	232,903	7	1,630
12	386	113	2.2	249	48,057	7	336
13	684	181	2.2	398	136,116	7	953
14	3,890	153	2.2	337	655,465	7	4,588
15	90	145	2.2	319	14,355	7	100
16	855	166	2.2	365	156,038	7	1,092
17	76	145	2.2	319	12,122	7	85
18	139	146	2.2	321	22,310	7	156
19	100	145	2.2	319	15,950	7	112
20	38	145	2.2	319	6,061	7	42
United States	11,258	145	2.2	319	1,795,651[e]	7	12,435

[a] See Table 15.

[b] Preliminary estimate, assuming no regional differences in the weight gain per day. It is expected that estimated differences will be obtained at a later date. The United States average is that given for fattening yearling cattle in National Research Council, Recommended Nutrient Allowances for Beef Cattle, Washington, 1950, p. 5. (NRC Recommended Nutrient Allowances for Domestic Animals Number 4, Revised.)

[c] Calculated from data in preceding columns.

[d] Preliminary estimate, assuming no regional differences in the concentrates fed per pound of gain. It is expected that estimated differences will be obtained at a later date. The estimate of 7 pounds was based on suggested rations given in: Davis, R. E., Feeding Cattle for Beef, U. S. Department of Agricultural Farmers' Bull. No. 1549, rev. 1955, p. 10.

[e] Sum of calculated state data.

TABLE 15

Fed Cattle and Calves Marketed: Estimated Number and Estimated Average Number of Days on Feed, Year Beginning October 1, 1957

Region and state	Number of cattle and calves marketed, year beginning October 1, 1957					Average no. of days on feed				
	estimated					reported data for 1951-52 and 1952-1953 [d]		estimate for year beginning Jan. 1 [e]		
	number of cattle and calves on feed, Jan. 1-1958 [a]	Ratio: number marketed / no. on feed [a] [b] Jan. 1-1958	Ratio: number marketed / no. on feed [a] [b] Jan. 1-1959	"adjusted" number on feed Jan. 1, 1958 [c]	reported [a]	steers	heifers	1957	1958	Used in study
	1,000 head	ratio	ratio	1,000 head	1,000 head	days	days	days	days	days
1. Wash.	48	--	--	--	--	--	--	--	--	150[j]
Oregon	34	--	--	--	--	--	--	--	--	
Total	82	--	--	151[i]	--	--	--	--	--	150[j]
2&3. Calif.	398	3.34	2.99	--	1,331	112	103	100	104	102
4. Nevada	28	--	--	52	--	118	109	--	--	115[k]
5. Idaho	114	--	1.62	185[g]	--	147	141	--	138	138
Utah	60	--	1.64	98[g]	--	164	142	--	132	132
Total	174	--	1.63	283	--	--	--	--	--	136
6. Arizona	190	2.09	1.91	--	398	110	110	124	132	128
7. Montana	66	--	1.45	96[g]	--	145	126	--	134	134
Wyoming	37	--	--	54[h]	--	181	173	--	--	182
Total	103	--	--	150	--	--	--	--	--	151
8. Colorado	251	1.90	1.97	--	477	160	145	141	145	143
9. N.Mexico	33	--	--	61[f]	--	--	--	--	--	113
10. N. Dakota	98	--	1.42	139[g]	--	--	--	--	141	141
S. Dakota	266	1.42	1.44	--	379	--	--	156	175	165
Total	364	--	1.43	--	--	--	--	--	--	159
11. Nebraska	543	2.36	2.08	--	1,154	--	--	135	134	134
Kansas	180	2.13	2.07	--	425	--	--	128	142	135
Total	723	2.18	2.08	--	1,579	--	--	--	--	134
12. Oklahoma	41	--	2.42	99[g]	--	--	--	--	99	99
Texas	122	2.35	2.10	--	287	--	--	117	119	118
Total	163	--	2.17	--	--	--	--	--	--	113
13. Minn.	367	1.46	1.36	--	535	--	--	187	181	184
Wisconsin	115	--	1.30	149[g]	--	--	--	--	170	170
Total	482	--	1.35	--	--	--	--	--	--	181
14. Iowa	1,284	1.74	1.70	--	2,237	--	--	161	158	160
Mo.	292	1.64	1.64	--	478	--	--	143	149	146
Ill.	649	1.81	1.88	--	1,175	--	--	145	142	144
Total	2,225	1.75	1.74	--	3,890	--	--	--	--	153

(Continued on next page.)

Table 15 continued.

Region and state	Number of cattle and calves marketed, year beginning October 1, 1957					Average no. of days on feed				
	estimated					reported data for 1951-52 and 1952-1953 [d]		estimate for year beginning Jan. 1 [e]		
	number of cattle and calves on feed, Jan. 1-1958 [a]	Ratio: number marketed / no. on feed [a] [b]		"adjusted" number on feed Jan. 1 1958 [c]	reported [a]					
		Jan. 1-1958	Jan. 1-1959			steers	heifers	1957	1958	Used in study
	1,000 head	ratio		1,000 head		days				
15. Ark.	--	--	--	--	--	--	--	--	--	--
La.	--	--	--	--	--	--	--	--	--	--
Miss.	--	--	--	--	--	--	--	--	--	--
Ala.	--	--	--	--	--	--	--	--	--	--
Total	90[i]	--	--	90[i]	--	--	--	--	--	145[l]
16. Mich.	110	--	1.43	157[g]	--	--	--	--	168	168
Ind.	287	1.55	1.41	--	444	--	--	160	164	162
Ohio	176	1.44	1.38	--	254	--	--	170	173	172
Total	573	--	1.40	--	--	--	--	--	--	166
17. W. Va.	--	--	--	--	--	--	--	--	--	--
Ky.	--	--	--	--	--	--	--	--	--	--
Tenn.	--	--	--	--	--	--	--	--	--	--
Total	76[i]	--	--	76[i]	--	--	--	--	--	145[l]
18. Pa.	78	--	1.78	139[g]	--	--	--	--	146	146
Other	--	--	--	--	--	--	--	--	--	--
Total	78	--	1.78	139	--	--	--	--	--	146
19. Va.	--	--	--	--	--	--	--	--	--	--
N.C.	--	--	--	--	--	--	--	--	--	--
S.C.	--	--	--	--	--	--	--	--	--	--
Ga.	--	--	--	--	--	--	--	--	--	--
Total	100[i]	--	--	100[i]	--	--	--	--	--	145[l]
Florida	38[i]	--	--	38[i]	--	--	--	--	--	145[l]
United States	(6,171)	--	1.84	1 684	9,574	--	--	--	--	145[l]

(Continued on next page.)

Table 15 continued.

a/ Agricultural Marketing Service, Cattle and Calves on Feed, Washington, Mt. An. 2-1 (1-59) and Washington, Mt An 2-1 (1-60).

b/ Calculated by dividing the number of fed cattle and calves marketed for the year beginning October 1, 1957 by the number of cattle and calves on feed January 1 of that feeding year.

c/ For states where data on marketings were not available, estimates were made by adjusting the January 1, inventory numbers by one of four methods, given in order of acceptability: (1) the 1959 ratio; (2) the ratio used for the other state in the region; (3) the average 1959 ratio for 21 states reporting both January 1 numbers and cattle marketed; and (4) for states with January inventory numbers given for the first time in 1960, a rough approximation of 1957/58 marketings was made, as noted in footnote (i).

d/ Scott, Frank S., Jr., Marketing Aspects of Western Cattle Finishing Operations, a Western Regional Research Publication, Nevada Agr. Expt. Sta. Bul. No. 190, 1955, pp. 31-32.

e/ Calculated from quarterly data on cattle on feed as illustrated in Table 17 for the United States. These are considered as very rough estimates.

f/ Estimated by using the average 1959 ratio for 21 states reporting both January 1 numbers and cattle marketed of (1.84).

g/ Estimated by using the 1959 ratio for that state.

h/ Estimated by using the 1959 ratio for Montana.

i/ Estimated by adjusting the inventory numbers on January 1, 1960, by the 21 state ratio of inventory numbers on January 1, 1958, (5,687,000) and January 1, 1960, (6,871,000), or 83 percent. This estimate is considered to be low since no allowance is made for feeding out more than one lot per year. The 1960 January 1 inventory data are as follows:

	Thousand head	
Region 15	108	(Ark. 23; La. 20; Miss. 25; Ala. 40)
Region 17	92	(W. Va. 0; Ky. 50; Tenn. 42)
Region 19	120	(Va. 23; N.C. 26; S.C. 16; Ga. 55)
Region 20	46	(Florida)

j/ Wyckoff, J.B., Cattle Feeding in the Columbia Basin, Washington Agr. Expt. Sta. Cir. 357, 1959. Estimated by assuming mid-points at class intervals for tabular data on page 7.

(Footnotes continued on next page.)

Table 15 continued.

k/ Based on data for 1951-53 by Scott, op, cit.

1/ Estimated average number of days on feed for total of 21 state marketings for year beginning October 1, 1958 (See Table 17 for calculations).

TABLE 16

Fed Cattle and Calves: Number on Feed, Classified by Length of Time on Feed at Beginning of Each Quarter, 21 States, in Thousands of Head, October 1, 1958-October 1, 1959

Length of time on feed	Row number	Date				
		Oct. 1, 1958	Jan. 1, 1959	April 1, 1959	July 1, 1959	Oct. 1, 1959
		1	2	3	4	5
Less than 3 months	A	2,098	4,863	2,383	2,067	2,557
3 - 6 months	B	1,040	1,205	3,305	1,669	1,207
Over 6 months	C	848	256	251	1,433	1,025

Source: Agricultural Marketing Service, Cattle and Calves on Feed January 1, 1960, Washington, Mt An 2-1 (1-60); and Mt An 2-1 (1-59).

TABLE 17

Fed Cattle and Calves: Method used in Estimating Average Number of Days on Feed[a/]

Length of time on feed	Estimated marketings					Days on feed (assumed class mean)	Method of calculation			
	Oct-Dec. 1958	Jan-Mar. 1959	Apr-June 1959	July-Sept. 1959	Total		Oct-Dec. 1958	Jan-Mar. 1959	Apr-June 1959	July-Sept. 1959
	1,000 head					days	(cell designation in Table 16)			
Less than 3 months	893	1,558	714	860	4,025	75	A1-B2	A2-B3	A3-B4	A4-B5
3 - 6 months	784	954	1,872	644	4,254	150	B1-C2	B2-C3	B3-C4	B4-C5
Over 6 months	848	256	251	1,433	2,788	240	C1	C2	C3	C4
Total	2,525	2,768	2,837	2,937	11,067	145	--	--	--	--

[a/] Derived from data in Table 16, as indicated under method of calculation. For example, marketings in the 1958 October-December quarter of 893,000 head were obtained by subtracting the number on feed the following January 1, that were on feed 3-6 months (row B, column 2, or 1,205,000 head) from the number on feed October 1, (row A, column 1, or 2,098,000 head). These data exclude short-fed cattle (placed on feed after beginning of quarter and marketed by end of quarter) estimated to equal some 400,000 head.

TABLE 18

Sheep Grain Fattened and Stock Sheep: Number and Concentrates Fed, Year Beginning October 1, 1957

	Sheep grain fattened					Stock sheep		
	number			concentrates fed		number	concentrates fed	
Region	on feed Jan. 1, 1958 a/	other b/	total	total	per head c/	Jan. 1, 1958 a/	total	per head d/
	1,000 head			1,000 tons	lbs.	1,000 head	1,000 tons	lbs.
1	53	13	66	4	125	1,102	10	18
2 & 3	250	62	312	20	125	1,616	15	18
4	16	4	20	1	125	418	4	18
5	146	36	182	11	125	2,317	21	18
6	26	6	32	2	125	417	4	18
7	253	63	316	20	125	3,663	33	18
8	504	125	629	39	125	1,252	11	18
9	42	11	53	3	125	1,172	11	18
10	365	91	456	29	125	1,808	49	54
11	676	168	844	53	125	787	21	54
12	232	58	290	18	125	4,907	44	18
13	273	68	341	21	125	963	36	76
14	770	191	961	60	125	2,403	91	76
15	6	1	7	1	125	351	9	54
16	377	94	471	29	125	1,858	71	76
17	--	--	--	--	--	1,237	33	54
18	21	5	26	2	125	583	16	54
19	--	--	--	--	--	464	13	54
20	--	--	--	--	--	9	--	54
United States	4,010	996	5,006	313	125	27,327	492	36

(Continued on next page.)

Table 18 continued.

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Lv. Gn. 1 (59).

b/ Sheep fed in late fall and slaughtered before January 1, 1958, and those placed on feed after that date are estimated at 5 percent of the United States lamb crop for 1957 of 19,925,000 lambs saved. This estimate is based on: Carpenter, G. Alvin, Marketing the California Lamb Crop, California Agr. Ext. Serv., 1959. Numbers of "other sheep grain fattened" are allocated by states on the basis of numbers on feed as of January 1, 1958.

c/ A feeding rate of 125 pounds per head for sheep grain fattened is assumed for all states. This is approximately equal to that reported in: American Feed Manufacturers Association, Estimated Feed Concentrates Fed in the Year Beginning October 1, 1957, Chicago, 1957.

d/ A feeding rate of 36 pounds per head for stock sheep is assumed for the United States average. This is approximately equal to that reported in: American Feed Manufacturers Association, Estimated Feed Use and Supplies for Feeding Year Beginning October 1, 1957, Chicago, 1957. The feeding rate for range areas of the Western Region (regions 1 through 9) plus Oklahoma and Texas (region 12) is assumed to equal 50 percent of the United States average. The feeding rate in the Corn Belt and Lake States (regions 13, 14, and 16) is assumed to be 211 percent of the United States average, and all other regions is assumed to be 150 percent of the United States average.These adjustments are approximately those used by Jennings, Ralph D., Feed Consumed by Livestock, Supply and Disposition of Feeds, 1949-50, by States, U. S. Department of Agriculture Stat. Bul. 145, June 1954.

TABLE 19

Hogs: Number Fed, Liveweight Production, Average Liveweight of Slaughter and Estimated Concentrates Fed, Year Beginning October 1, 1957

Region	Number fed in year beginning October 1[a]	Production, liveweight in year beginning October 1[b]	Avg. liveweight of hogs slaughtered, calendar year 1958[c]	Concentrates fed		
				total[d]	per 100 pounds produced[e]	per pig fed[f]
	1,000 head	million pounds	pounds	1,000 tons	pounds	
1	462	100	211	252	505	1,091
2&3	540	106	236	276	520	1,022
4	26	6	224	15	512	1,154
5	301	60	228	154	515	1,023
6	43	9	226	23	514	1,070
7	253	61	231	158	517	1,249
8	246	55	241	144	523	1,171
9	58	12	235	31	519	1,069
10	3,134	791	258	2,108	533	1,345
11	5,093	1,187	249	3,128	527	1,228
12	2,168	456	234	1,181	518	1,089
13	9,661	2,221	244	5,819	524	1,205
14	36,493	8,309	247	21,853	526	1,198
15	3,634	624	214	1,579	506	869
16	12,928	2,593	226	6,664	514	1,031
17	4,044	790	224	2,022	512	1,000
18	1,815	351	217	892	508	983
19	6,635	1,198	209	3,013	503	908
20	638	101	209	254	503	796
United States	88,172	19,030	235	49,566	519	1,124

[a] Calculation of the number fed in the year beginning October 1 is based on reported estimates of fall and spring pigs saved and on estimated percentage of feed that is fed after October 1 to the spring pig crop. Data on number of pigs saved are from: Agricultural Marketing Service, Meat Animals, Farm Production, Disposition, and Income, by States, 1957-58, Washington, Mt An 1-1 (59). Data on the percentage of feed fed after October 1 for various states are from: Jennings, Ralph D., Animal Units of Livestock Fed Annually, 1909 to 1955, Washington, U. S. Department of Agriculture Stat. Bul. 194, October, 1956, p. 9. The method of obtaining the numbers fed in the year beginning October 1, 1957 is indicated for the United States as follows:

(Continued on next page.)

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Table 19 continued.

Item	Estimated percentage of feed that is fed after October 1	Number of pigs saved	Estimated number fed in year
	percent	1,000 head	
Fall pigs saved:			
1957	100	36,148	36,148
Spring pigs saved:			
1957	35	51,812	18,134
1958	65	52,336	34,018
Total	--	--	88,300

The United States total shown in the body of the table is obtained by addition of individual state calculations and differs slightly from the United States total shown here.

b/ Liveweight production for the United States is from: Hodges, Earl F., *Livestock Production Units, Annual 1910-57*, Washington Agricultural Research Service 43-103, June 1959 and *Livestock Production Units, Annual 1910-56*, Washington Agricultural Research Service 43-80, August 1958. Liveweight production by states was obtained by adjusting 1958 calendar year production, given in Agricultural Marketing Service, *Meat Animals, Farm Production Disposition, and Income, by States, 1957-58*, Washington, Mt An 1-1 (59), by the following percentage:

$$\frac{\text{U.S. liveweight prod., Oct. 1, 1957-Sept. 30, 1958}}{\text{U.S. liveweight prod., calendar year 1958}} = \frac{19{,}015 \text{ mil.lbs.}}{19{,}406} = 97.99$$

c/ Agricultural Marketing Service, *Supplement for 1958 to Livestock and Meat Statistics*, Washington, U.S. Department of Agriculture Supplement for 1958 to Stat. Bul. 230, June 1959, p. 84. Data are for commercial hog slaughter weights.

d/ Calculated from regional data on liveweight production multiplied by concentrates fed per 100 pounds produced.

e/ Regional differences in concentrates fed per 100 pounds produced are assumed to differ only according to average liveweight of hogs slaughtered. The method used in estimating concentrates fed by weight class is given in Table 20,

f/ Calculated by dividing total concentrates fed by number of pigs fed in year beginning October 1, 1957.

TABLE 20

Hogs: Method Used in Estimating Concentrates Fed, by Liveweight, Year Beginning October 1, 1957

Average live-weight	NRC data on feed requirements per hog[a]			Estimated concentrates fed per hog[b]		
	total	per added 10 pounds of gain	per 100 pounds liveweight	per 100 pounds liveweight[c]	total[d]	per added 10 pounds of gain
	pounds					
185	502	--	271	489	905	--
195	543	41	278	495	965	60
205	585	42	285	501	1,027	62
215	628	43	292	507	1,090	63
225	672	44	299	513	1,154	64
235	717	45	305	519	1,219	65
245	763	46	311	525	1,286	67
255	810	47	317	531	1,354	68

a/ Adapted from data presented in National Research Council, Nutrient Requirements for Swine, 1953, p. 2. National Research Council Revised Publication 295. Feed requirements for a 225-pound hog, for example, were calculated as follows, using NRC data to obtain feed per pound of gain.

Weight of hog	Feed per pound of gain	Total feed requirements	
		added	total
	pounds		
34-74	2.67	109	109
75-124	3.31	166	275
125-174	3.78	189	464
175-225	4.17	208	672
over 225	4.61		

b/ The level of concentrates fed per hog was estimated first for a 235-pound hog which was the average liveweight of hogs slaughtered commercially in the United States in 1958. A concentrate level of 519 pounds per 100 pounds produced appeared to be in line with available feed supplies and feedsfed to other livestock. This estimate was arrived at independently but is practically equal to that of 520 pounds per 100 pounds of hogs produced, as reported by Paulson, Arnold, Don Kaldor, Geoffrey Shepherd, Projections for the Feed-Livestock Economy, 1959 to 1963 with Free Prices and No Controls, Iowa State University of Science and Technology, Center for Agricultural and Economic Adjustment, Gen. Econ. 154, December 1959. This level of feeding is above that for the year beginning October 1, 1956, of 469 pounds per 100 pounds produced, as reported by Jennings, Ralph D. Consumption of Feed by Livestock, 1909-56, Washington,

(Continued on next page)

Table 20 continued.

U. S. Department of Agriculture Prod. Res. Rpt. 21, p. 111, and above that indicated for several previous years. One reason for this high figure is due to feed required for sows not marketed, as reflected in the sharp increase in the number of sows farrowing in the fall of 1958 of 5,926 as compared with 5,124 in the fall of 1957.

c/ Estimated "concentrates fed per 100 pounds" for various weight groups is assumed to vary from that for the 235-pound hog level by 6 pounds of feed per 10 pound weight group. This feed differential is approximately equal to that derived from the NRC data, as shown in preceding column.

d/ Calculated from estimated feed per 100 pounds and the relevant average liveweight.

TABLE 21

Layers: Number, Eggs Produced, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Year Beginning October 1, 1957

Region	Number		Eggs produced			Concentrates fed[e]	
	hens and pullets, Jan. 1, 1958 [a]	avg. no. of layers, year beginning Oct. 1957[b]	Total for year beginning Oct. 1957[b]	per layer[c]	Average liveweight of mature birds sold[d]	Total	Per avg. number of layers
	million head	million head	million	number	pounds	1,000 tons	pounds
1	8.8	7.2	1,602	222	4.9	394	109
2&3	24.9	21.4	4,807	224	4.5	1,125	105
4	0.1	0.1	16	157	4.6	5	97
5	3.8	3.2	660	207	5.1	172	108
6	0.6	0.5	106	209	4.9	27	107
7	1.8	1.6	307	196	4.7	81	103
8	1.8	1.5	294	190	4.8	80	103
9	0.7	0.6	119	186	4.6	32	100
10	11.7	10.0	1,948	194	4.8	522	104
11	20.3	17.7	3,539	200	5.0	939	106
12	19.4	16.5	3,016	182	5.0	869	105
13	33.9	30.1	6,270	208	4.8	1,582	105
14	57.1	49.1	9,964	203	5.1	2,626	107
15	17.3	14.3	2,436	170	5.7	774	108
16	35.6	31.3	6,337	202	5.4	1,724	110
17	16.4	13.4	2,231	167	5.5	703	105
18	64.5	55.1	11,155	202	5.5	3,033	110
19	29.6	23.4	4,449	190	5.9	1,324	113
20	3.9	3.2	668	207	5.1	173	107
United States	352.5	300.6	59,924	199	5.2	16,185	108

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Lv. Gn. 1 (59).

b/ Agricultural Marketing Service, Chickens and Eggs, Layers and Egg Production, Monthly 1957-58, Pou. 2-4 (2-59).

c/ Calculated from unrounded data in preceding two columns.

d/ Agricultural Marketing Service, Chickens and Eggs, Pou. 2-3 (59). Regional averages are obtained by weighting state data by numbers sold.

e/ Regional differences in concentrates fed per bird are assumed to be due only to regional differences in average weight per bird and egg production per layer. The basis for the estimates of concentrates fed per bird is given in Table 22.

TABLE 22

Layers: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight and Level of Egg Production, Year Beginning October 1, 1957 a/

Average liveweight	Estimated concentrates fed per bird for maintenance and various levels of egg production			
	0 eggs	100 eggs	200 eggs	300 eggs
	pounds			
4.25	72	86	100	114
4.50	74	88	102	116
4.75	76	90	104	118
5.00	78	92	106	120
5.25	80	94	108	122
5.50	82	96	110	124
5.75	84	98	112	126

a/ Adapted from: National Research Council, Nutrient Requirements for Poultry, Washington, Rev. Pub. 301, 1954 , p. 21. The 1958 United States average liveweight of mature farm chickens sold equaled 5.2 pounds, and average egg production for the year beginning October 1, 1957, equaled 199 eggs per layer. The estimated level of concentrates fed of 108 pounds was obtained by adding 13 pounds of feed per bird to the NRC data on feed requirements for the various weight and egg production categories. This allows for such factors as death loss, disease, and also for feed required for older pullets not of laying age that are not included in such other categories as the January 1 inventory of "farm chickens raised." The assumed linear production function of the NRC data is not unrealistic for layers according to Hansen, Peter L. and Ronald L. Mighell, "The Economics of Input-Output Relationships in Feeding for Egg Production," Agricultural Economics Research, Vol. 4, No. 1, January, 1952, pp. 1-8.

TABLE 23

Farm Chickens: Number Raised, Production, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Calendar Year 1958

Region	Number raised[a]	Production liveweight[a]	Average liveweight per bird[a] [b]	Concentrates fed[c] total	Concentrates fed[c] per bird raised
	million head	million pounds	pounds	1,000 tons	pounds
1	9.1	30.6	3.37	105	23
2&3	28.6	89.4	3.12	300	21
4	0.2	0.5	2.91	2	19
5	4.7	15.7	3.32	54	23
6	0.9	3.0	3.36	10	23
7	3.4	11.2	3.31	37	22
8	2.3	7.3	3.25	25	22
9	0.7	1.6	2.37	4	12
10	16.4	59.7	3.63	197	24
11	26.7	92.0	3.45	320	24
12	22.3	63.7	2.86	201	18
13	41.1	153.1	3.72	493	24
14	67.9	258.7	3.81	849	25
15	24.0	66.4	2.76	204	17
16	41.9	167.3	4.00	523	25
17	21.1	61.2	2.90	201	19
18	69.3	268.9	3.88	867	25
19	45.9	147.8	3.22	505	22
20	4.7	14.5	3.05	47	20
United States	431.3	1,512.5	3.51	4,944	24

[a] Agricultural Marketing Service, Chickens and Eggs, Washington, Pou. 2-3 (59).

[b] Calculated from unrounded data of preceding two columns.

[c] Regional differences in concentrates fed per bird are assumed to be due only to regional differences in average weight per bird. The basis for the estimates of concentrates fed per bird is given in Table 24.

TABLE 24

Farm Chickens: Method Used in Estimating Concentrates Fed Per Bird Raised, Average for Light and Heavy Breeds, Calendar Year 1958

Average liveweight	NRC feed requirements a/		Estimated feed	
	light breeds	heavy breeds	requirements b/	consumed c/
pounds				
2.0	6	5	6	8
2.5	11	7	10	14
3.0	16	10	14	20
3.5	24	12	17	24
4.0	--	17	18	25
4.5	--	22	22	31

a/ National Research Council, Nutrient Requirements for Poultry, Washington, 1954, p. 22. (National Research Council Rev. Pub. 301.) Data relate to feed requirements for pullets.

b/ Feed requirement for 2 pound bird is that for light breeds, and requirement for 4.5 pound bird is that for heavy breeds. Requirements for other weights were approximations that attempted to allow for average flock composition.

c/ Includes a 40 percent allowance over estimated feed requirements (column 3) to account for farm production conditions and death losses, which numbered 80.8 million head in 1958, or 23 percent of chickens produced. The average weight of farm chickens raised in 1958 equaled 3.51 pounds per bird.

TABLE 25

Broilers: Number Produced, Production, Average Liveweight Per Bird, and Estimated Concentrates Fed, by Region, Calendar Year 1958

Region	Number produced a/	Production liveweight a/	Average liveweight per bird b/	Concentrates fed c/	
				total	per bird
	million head	million pounds	pounds	1,000 tons	pounds
1	23.3	77.5	3.33	100	8.58
2&3	47.8	157.9	3.30	202	8.46
4	--	--	--	--	--
5	4.9	15.2	3.13	19	7.80
6	0.5	1.6	2.90	2	6.95
7	--	--	--	--	--
8	1.2	3.7	3.20	5	8.06
9	--	--	--	--	--
10	--	--	--	--	--
11	4.3	13.3	3.11	17	7.73
12	121.5	365.2	3.01	447	7.36
13	23.4	77.7	3.32	100	8.54
14	46.5	149.6	3.22	189	8.14
15	370.9	1,149.5	3.10	1,426	7.69
16	66.9	235.8	3.53	315	9.43
17	74.8	246.9	3.30	317	8.46
18	354.6	1,268.5	3.58	1,711	9.65
19	507.8	1,633.7	3.22	2,067	8.14
20	11.3	35.1	3.10	44	7.69
United States	1,659.6	5,431.3	3.27	6,961	8.39

a/ Agricultural Marketing Service, Chickens and Eggs, Washington, Pou. 2-3 (59).

b/ Calculated from unrounded data in preceding two columns.

c/ Regional differences in concentrates fed per bird are assumed to be due only to regional differences in average weight per bird. The basis for the estimates of concentrates fed per bird is given in Table 26.

TABLE 26

Broilers: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight, for Calendar Year 1958

Average liveweight	Production data on concentrates fed per bird		Estimated concentrates fed per bird	
	total[a]	added (per 1/4 lb.)[b]	total[c]	added (per 1/4 lb.)[d]
	pounds			
2.50	6.33	--	5.47	--
2.75	7.25	0.92	6.39	0.92
3.00	8.18	.93	7.32	.93
3.25	9.11	.93	8.25	.93
3.50	10.15	1.04	9.29	1.04
3.75	11.29	1.14	10.43	1.14
4.00	12.63	1.34	11.77	1.34
4.25	14.09	1.46	13.23	1.46
4.50	15.84	1.75	14.98	1.75

[a] Hansen, Peter L. and Ronald L. Mighell, Economic Choices in Broiler Production, U.S. Department of Agriculture Technical Bul. 1154, 1956. p. 12. Concentrates fed include an allowance for nonsurviving birds.

[b] Calculated from column 1.

[c] Feed efficiency in broiler production has increased in recent years, as given in Jennings, Ralph D., Consumption of Feed by Livestock, 1909-56, Relation Between Feed, Livestock, and Food at the National Level, Washington, 1958, p. 110. U.S. Department of Agriculture Production Res. Rept. 21. The average weight of broilers produced in the United States in 1958 was 3.27 pounds and the feed requirement per bird was estimated at 8.39 pounds. Differences due to weight per bird were then calculated, based on the "added feed per pound of gain" data shown in columns 2 and 4.

[d] Assumed to equal calculated values shown in column 2.

TABLE 27

Turkeys: Number Raised, Production, Average Liveweight Per Bird and Estimated Concentrates Fed, by Region, Calendar Year 1958

Region	Number raised a/	Production liveweight a/	Avg. liveweight per bird sold a/	Concentrates fed b/	
				total	per bird
	million head	million pounds	pounds	1,000 tons	pounds
1	2.1	41.0	19.5	106	100
2&3	13.6	255.2	18.8	648	95
4	c/	c/	20.0	--	103
5	3.0	57.9	19.3	148	98
6	0.1	2.0	19.9	5	102
7	c/	0.5	19.0	1	96
8	1.3	26.2	19.8	68	102
9	0.1	1.5	19.0	4	96
10	1.4	24.2	17.1	59	83
11	1.8	35.4	19.4	90	99
12	4.8	83.7	17.7	207	87
13	13.3	203.0	15.3	493	74
14	11.0	200.6	18.2	496	90
15	2.9	51.6	17.6	128	87
16	7.2	125.4	17.5	308	86
17	1.9	26.9	13.8	64	66
18	4.0	69.9	17.6	174	87
19	9.4	124.7	13.3	301	64
20	0.3	4.3	16.4	10	79
United States	78.3	1,334.0	17.1	3,310	84

a/ Agricultural Marketing Service, Turkeys, Farm Production, Disposition, Cash Receipts, and Gross Income 1958-59, Washington, Pou. 3-1-1 (60).

b/ Regional differences in concentrates fed per bird are assumed to be due only to regional differences in average weight per bird. The basis for the estimates of concentrates fed per bird is given in Table 28.

c/ Less than 50,000.

TABLE 28

Turkeys: Method Used in Estimating Concentrates Fed Per Bird, by Liveweight, for Calendar Year 1958

Average liveweight	NRC data on feed requirements per bird		Estimated concentrates fed per bird	
	total a/	added (per 2 lbs. gain) b/	total c/	added (per 2 lbs. gain) d/
	pounds			
10	27.1	--	50	--
12	37.3	10.2	58	8
14	46.8	9.5	67	9
16	56.8	10.0	77	10
18	68.3	11.5	89	12
20	84.3	16.0	103	14
22	99.8	15.5	119	16

a/ National Research Council, Nutrient Requirements for Poultry, Washington, rev. January, 1954, p. 22. (Nutrient Requirements for Domestic Animals, No. 1, National Research Council Publication No. 301.) Data relate to requirements for Broad-Breasted Bronze turkeys.

b/ Calculated from column 1.

c/ The average weight of turkeys sold in the United States in 1958 was 17.1 pounds. Concentrates fed (84 pounds per bird) was estimated at 30 percent above the NRC feed requirements data to reflect two factors: namely, (1) to allow for farm production conditions, including death loss; and (2) to recognize that average weights tend to underestimate both the higher feed requirements for light breeds marketed at weights below 10 pounds and the higher feed requirements for heavy breeds fed to above average weights. Differences due to weight per bird were then calculated, based on the "added feed per pound of gain" shown in column 4.

d/ Based on NRC data in column 2, slightly adjusted.

TABLE 29

Horses and Mules: Number, 2 Years Old and Over, Fed, Year Beginning October 1, 1957

Region	Number January 1, 1958 a/	Concentrates fed	
		per head b/	total
	1,000 head	pounds	1,000 tons
1	72	446	16
2&3	65	191	6
4	16	191	2
5	74	191	7
6	52	191	5
7	125	446	28
8	63	701	22
9	55	701	19
10	125	701	44
11	131	701	46
12	310	956	148
13	122	956	58
14	227	956	109
15	517	1,658	429
16	124	956	59
17	396	1,658	328
18	163	1,402	114
19	496	2,168	538
20	32	2,168	35
United States	3,165	1,275	2,013 c/

a/ Agricultural Marketing Service, Livestock and Poultry Inventory, January 1, Lv. Gn. 1 (59).

b/ United States average: Jennings, R. D., Consumption of Feed by Livestock, 1909-56, U. S. Department of Agriculture Production Res. Rept. 21, 1958, p. 66. Feeding rates for individual regions were determined by using the relative feeding rates given in Jennings, R. D., Feed Consumed by Livestock, Supply and Disposition of Feeds, 1949-50, by States, U. S. Department of Agriculture Stat. Bul. 145, 1954, p. 44. The regional feeding rates are as follows, expressed as a percent of the United States average:

Region	Percent
2,3,4,5,6	15
1,7	35
8,9,10,11	55
12,13,14,16	75
18	110
15,17	130
19,20	170

c/ Sum of individual states.

Milk Cows.--The Agricultural Marketing Service reports levels of grain and other concentrates fed to milk cows, by calendar year, in the March issue of Milk Production. The 1958 level of milk production corresponded fairly closely with that for the year beginning October 1, 1957, and so feed consumed in the calendar year 1958 was used as a basis for the estimates. These data are available by state. Concentrates fed were adjusted to account for feed consumed by "heifers 2 years old and older not fresh" since these numbers are included in the January 1, inventory of milk cows. A summary of these calculations is given in Table 11.

Other Dairy Cattle.--Feeding rates used for the United States for dairy heifers 1-2 years, heifer calves, and dairy bulls are approximately equal to those reported by the American Feed Manufacturers Association report, Estimated Feed Use and Supplies For the Feeding Year Beginning October 1, 1957. Regional differences were introduced to allow for the fact that lower feeding rates are presumed to exist in the western region (see Table 12).

Beef Cows, Bulls, and Other Beef Cattle.--Feeding rates for beef cattle, excluding numbers grain fattened, were developed for the United States using data reported by the American Feed Manufacturers Association. As for "other dairy cattle," regional differences were introduced mainly to allow for lower rates in the range areas and to allow for higher rates in the corn belt area (see Table 13)

Beef Cattle Grain Fattened.--Concentrates fed to this class of livestock required estimates in four areas, namely: (1) the number of fed cattle and calves marketed; (2) the average number of days on feed; (3) the weight gain per day; and (4) the pounds of concentrates fed per pound of gain. These data are considered as preliminary and might be classified in the "more research is needed" category, especially in view of the interests of the western regional livestock marketing committee.

Information presented in Table 15 indicates the data relating to numbers of fed cattle and calves marketed during the October-September year. Reported data

are shown for 13 states and estimates are indicated for other areas, based on such information as the number of cattle and calves on feed as of January 1, 1958.

Average number of days on feed by state or region are summarized in Table 14, with the methods used in certain calculations indicated in detail in Tables 16 and 17. Data are reported as to length of time on feed as of January, April, July, and October for certain states. This allows a rough approximation to be made as to derived marketings by quarter and an estimate of the "average number of days on feed" if an assumption is made as to the class mean "number of days on feed" for categories "less than 3 months," "3-6 months," and "over 6 months."

The weight gain per day may well vary significantly among areas, but an average of 2.2 pounds was used for all regions due to lack of better estimates. This figure is that given for fattening yearling cattle as reported by the National Research Council report on Recommended Nutrient Allowances for Beef Cattle.

Concentrates fed per pound of gain also may well vary significantly among areas, but an average of 7 pounds of concentrates per pound of gain was used for all regions. This estimate is based on the total daily feed ration for a 600-pound steer averaged for the entire feeding period, as reported by Davis.1/ The ration selected consisted of 16 pounds of corn and 7 pounds of legume hay. If the assumed "weight gain per day" of 2.2 is divided into the 16 pounds of concentrates fed, approximately 7 pounds of concentrates fed per pound of gain is obtained.

Total concentrates fed to "beef cattle grain fattened" was then obtained by use of the above mentioned data, as summarized in Table 14.

Stock Sheep and Sheep Grain Fattened.--Separate estimates as to numbers and feeds fed per head were made for stock sheep and numbers grain fattened, as indicated in Table 18. The number of sheep on feed January 1, 1958 was increased by 5 percent of the 1957 United States lamb crop to allow for those fed out in

---

1/ Davis, R. E., Feeding Cattle for Beef, Washington, U. S. Department of Agriculture Farmers' Bul. No. 1549, rev. 1955, p. 10.

late fall and slaughtered before January 1, and for those placed on feed after January 1. Uniform feeding rates were assumed for all areas for sheep grain fattened, with the level approximately that reported by the American Feed Manufacturers Association for the United States average. The feeding rate for stock sheep for the United States also was obtained from this source. Differential feeding rates, by region, were introduced to allow for range feeding conditions in the west.

Hogs.--The level of concentrates fed was estimated first for a 235-pound hog, which was the average liveweight of hogs slaughtered commercially in the United States in 1958. This level was determined in conjunction with amounts of feed fed to other livestock and the total feed available, as reported by the Agricultural Marketing Service. Regional differences in feeding rates were introduced on the basis of regional average liveweight of hogs slaughtered in 1958. The feed differentials were developed from National Research Council data, adjusted to the assumed level of feeding for the year beginning October 1, 1957 (see Tables 19 and 20).

Poultry.--Separate estimates of feed consumed by layers, farm chickens, broilers, and turkeys are summarized in Tables 21-28. Feed consumed by layers introduces regional differentials based on average liveweight and production per bird. For other classes of poultry, regional differentials allow for differences in the average weight per bird. Relationships reported by the National Research Council were employed in developing these differential feeding rates.

Horses and Mules.--The level of feeding of horses and mules was based on reports by R. D. Jennings, as noted in Table 29. Regional differentials were introduced based on information provided in these reports.

Feed Production, Stocks and Non-Feed Uses

Feed and Food Grains.--Production and stocks data on feed grains is readily available, by state, in reports of the Agricultural Marketing Service (see Tables 30 and 31). In this report, production of corn and sorghum grains are for

TABLE 30

Feed and Food Grains: Production of Feed Grains by Region, in Thousands of Tons, Relating to 1957 Crop for Corn and Sorghum Grains, and the 1958 Crop for Oats and Barley, and to Wheat and Rye Fed for Year Beginning October 1, 1957

Region	Feed grains [a]					Wheat and rye fed [c]
	corn[b]	oats	barley	sorghum	all grains	
1	166	274	1,008	--	1,448	86
2&3	537	97	1,620	370	2,624	14
4	6	3	17	--	26	8
5	194	174	649	--	1,017	89
6	42	7	226	157	432	4
7	157	221	1,269	--	1,647	80
8	742	75	310	459	1,586	38
9	44	10	29	184	267	7
10	4,621	3,150	2,985	192	10,948	63
11	7,603	984	586	5,781	14,954	144
12	1,259	1,207	606	7,093	10,165	69
13	13,559	5,832	789	--	20,180	50
14	36,639	6,133	288	1,144	44,204	150
15	3,439	247	8	180	3,874	45
16	14,885	2,505	234	37	17,661	299
17	3,253	105	101	98	3,557	66
18	3,370	1,126	388	--	4,884	235
19	4,935	592	178	106	5,811	153
20	374	13	--	--	387	--
United States	95,825	22,755	11,291	15,801	145,672	1,600

[a] Agricultural Marketing Service, Crop Production 1958 Annual Summary, Washington, Cr. Pr. 2-1 (58).

[b] Total production of corn.

[c] The United States total for wheat and rye fed is that given in: Agricultural Marketing Service, The Feed Situation, Washington, Fd. S-178, Nov. 1959. The regional estimates were obtained by adjusting upward the quantity of wheat and rye "fed to livestock on farms where grown," as reported in: Agricultural Marketing Service, Field and Seed Crops, Production, Farm Use, Sales, Value, by States, 1957-58, Washington, Cr. Pr. 1, 1959. The adjustment factor for wheat was 1.348 and for rye 1.58.

TABLE 31

Stocks of Feed Grains: October 1, 1957 and 1958, by Regions, in Thousands of Tons

Region	Corn		Oats		Barley		Sorghum grain		All grains	
	October 1 1957	October 1 1958	October 1 1957	October 1 1958	October 1 1957	October 1 1958	October 1 1957	October 1 1958	October 1 1957	October 1 1958
1	10	38	344	347	1,777	1,539	--	111	2,131	2,035
2&3	55	63	70	77	1,355	1,147	26	572	1,506	1,859
4	--	--	3	2	17	16	--	27	20	45
5	7	19	165	163	639	663	--	31	811	876
6	4	3	7	4	131	98	29	98	171	203
7	1	8	242	259	1,326	1,616	--	--	1,569	1,883
8	22	100	85	74	421	317	17	54	545	545
9	2	2	5	8	9	15	30	51	46	76
10	2,147	2,585	2,695	3,320	2,179	3,017	3	34	7,024	8,956
11	4,441	5,061	1,172	976	465	483	101	2,105	6,179	8,625
12	165	96	611	1,020	440	486	1,882	4,885	3,098	6,487
13	5,601	5,372	4,727	5,738	1,431	1,682	--	--	11,759	12,792
14	21,231	21,586	4,814	5,375	243	193	31	484	26,319	27,638
15	192	155	254	185	39	24	101	188	586	552
16	3,969	4,389	1,705	2,229	143	162	--	1	5,817	6,781
17	395	305	96	95	74	49	2	6	567	455
18	1,160	1,154	1,141	1,116	377	309	1	14	2,679	2,593
19	338	221	427	369	106	109	2	2	873	701
20	11	17	4	4	1	--	--	--	16	21
United States	39,751	41,174	18,567	21,361	11,173	11,925	2,225	8,663	71,716	83,123

Source: Agricultural Marketing Service, *Stocks of Grains in All Positions*, Washington; Gr. Lg. 11-1 (10-59), and Washington, Gr. Lg. 11-1 (10-58).

the 1957 crop, and for oats and barley are for the 1958 crop. However, stocks relate to October 1, for all grains. This method follows that of Jennings in his study of supply and disposition for the year beginning October 1, 1949. Food and industrial uses of the feed grains are given for the United States total, but regional estimates were required. These were made mainly on the basis of industry statistics from the 1954 Census of Manufacturers (see Table 32). Use for farm food and seed was developed from published data on farm food use and by applying seeding rates to planted acreage for seed use (see Table 33). Data for the food grains relate only to wheat and rye fed (see Table 30). An estimate of the United States total of wheat and rye fed is available in The Feed Situation. Regional estimates were obtained by adjusting upward the quantity of wheat and rye "fed to livestock on farms where grown." This adjustment factor was 1.3 for wheat and 1.6 for rye. This assumes no shipment of these feeds for feed use.

High-Protein and Other Byproduct Feeds.--Production of these feeds is available for the United States in various issues of The Feed Situation. Regional data on production, in general, have required various estimating procedures and sources of data. These are fully detailed in footnotes to Tables 34 and 35, and no further explanation is required here. Obviously, the degree of accuracy leaves something to be desired, but may be reasonably accurate for the regional breakdown employed here. Stocks of the principal oilseed meals and alfalfa meal are reported at processors' plants and are shown in Table 36.

Foreign Trade

Imports and exports of corn, oats, barley and rye, sorghum grain, and "animal feeds not elsewhere classified" are reported, by port, by the U. S. Department of the Army, Office of Chief of Engineers, in Waterbourne Commerce of the United States. These data relate to the calendar year 1958. Net exports of corn for the calendar year 1958 were reported at 4,830 thousand tons, as compared to net exports in the October year of 5,057, as reported in The Feed Situation.

the 1957 crop, and the acreage [illegible] for the 1958 crop. [illegible] [illegible] 1, [illegible]. [illegible] of [illegible], [illegible] supply and disappearance for the year beginning [illegible] 1, 1957. [illegible] [illegible] of the [illegible] [illegible] for [illegible] [illegible], [illegible] [illegible] [illegible] [illegible] (see Table [illegible]). [illegible] [illegible] [illegible] [illegible] (see Table [illegible]). [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

France, 1957

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

TABLE 32

Corn, Oats, Barley, and Sorghum: Food and Industrial Uses, by Regions, in Thousands of Tons, Year Beginning October, 1957[a]

	Corn									
Region	dry milling	cereal break-fast foods	beer and ale	dis-tilled liquors	wet milling	all uses	Oats b/	Barley b/	Sorghum c/	Total
1	--	1	3	1	--	5	2	47	--	54
2&3	81	28	11	21	12	153	46	47	3	249
4	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	35	35	--	--	--	35
6	--	--	--	--	--	--	--	--	--	--
7	--	--	1	--	--	1	1	--	--	2
8	--	--	2	--	--	2	--	--	--	2
9	--	--	--	--	--	--	--	--	--	--
10	44	--	--	--	--	44	--	--	--	44
11	114	8	2	2	--	126	13	--	10	149
12	291	--	3	--	80	374	--	--	133	507
13	--	13	23	1	--	37	22	1,409	--	1,468
14	361	53	18	85	3,374	3,891	86	326	35	4,338
15	262	--	3	--	3	268	--	--	--	268
16	262	220	15	117	414	1,028	358	82	--	1,468
17	355	--	3	250	3	611	--	--	--	611
18	140	41	41	165	60	447	64	153	71	735
19	274	--	--	2	3	279	--	--	--	279
20	--	--	1	--	3	4	--	--	--	4
United States	2,184	364	126[d]	644[d]	3,987	7,305	592	2,064	252	10,213

a/ United States data relate to the year beginning October 1, 1957, for corn and sorghum, and to the year beginning July 1, 1957, for oats and barley. Source: Agricultural Marketing Service, The Feed Situation, Washington, Fd S-178, November 1959.

b/ Allocation of production by region is based on the region's share of "value of shipments" in 1954, as reported by U. S. Bureau of the Census, Census of Manufactures 1954, Vol. 2, Industry Statistics, Washington, 1957.

c/ Allocation of production by region is based on the region's share of production in 1950, as reported by Jennings, R.D., Feed Consumed by Livestock, Supply and Disposition of Feeds, 1949-50, by States, Washington, U. S. Department of Agriculture Stat. Bul. 145, 1954.

d/ Allocation based on percentages of corn purchased for beer and ale (16.3%) and for distilled liquor (83.7%) as reported by the U. S. Bureau of the Census, op.cit.

TABLE 33

Feed Grains: Use for Farm Food and Seed, in Thousands of Tons, Year Beginning October 1, 1957 a/

Region	Corn	Oats	Barley	Sorghum	All grains
1	--	25	56	--	81
2&3	2	22	85	2	111
4	--	--	1	--	1
5	--	10	32	--	42
6	1	1	10	1	13
7	1	16	53	--	70
8	2	8	17	9	36
9	--	1	1	2	4
10	21	186	167	2	376
11	24	79	37	36	176
12	11	117	36	42	206
13	40	299	42	--	381
14	95	400	23	9	527
15	73	68	1	4	146
16	43	119	14	--	176
17	25	25	10	1	61
18	16	65	22	--	103
19	83	89	12	1	185
20	5	7	--	--	12
United States	442	1,537	619	109	2,707

a/ Farm food: Agricultural Marketing Service, *Field and Seed Crops, Production, Farm Use, Sales, Value, by States, 1957-58*, Washington, Cr. Pr. 1, 1959. Seed use was estimated by applying seeding rates per acre to planted acreage data. Seeding rates are reported in: United States Department of Agriculture, *Agricultural Statistics 1958*, Washington, 1959.

TABLE 34

High Protein Feeds: Production by Regions, in Thousands of Tons, Year Beginning October 1, 1957 a/

	Oilseed meal						Animal and fish					Grain				
Region	soybean meal b/	cotton-seed meal b/	linseed meal c/	peanut meal d/	copra c/	total	meat scraps and tankage e/	fish by-products f/	comm. dried milk products g/	non-comm. milk products h/	total animal protein	corn gluten feed	brewers dried grains	distiller dried grains	total	Total high protein feed
1	--	--	8	--	6	14	29	14	3	34	80	--	6	--	6	100
2&3	62	279	30	--	107	478	116	50	6	50	222	3	19	9	31	731
4	--	--	--	--	--	--	1	--	--	1	2	--	--	--	--	2
5	--	--	--	--	--	--	6	--	4	25	35	9	--	--	9	44
6	--	133	--	--	--	133	3	--	--	3	6	--	1	--	1	140
7	--	--	--	--	--	--	2	--	--	8	10	--	1	--	1	11
8	--	--	--	--	--	--	15	--	1	12	28	--	3	--	3	31
9	--	16	--	--	--	16	1	--	--	2	3	--	--	--	--	19
10	18	--	7	--	--	25	15	--	5	36	56	--	--	--	--	81
11	124	--	8	--	--	132	95	--	6	49	150	--	3	1	4	286
12	62	742	15	8	6	833	81	6	2	27	116	21	6	--	27	976
13	633	--	321	--	--	954	153	--	51	272	476	--	41	--	41	1,471
14	4,423	13	15	--	--	4,451	232	--	22	123	377	871	33	37	941	5,769
15	422	413	--	4	--	839	41	56	2	21	120	1	6	--	7	966
16	1,576	6	9	--	--	1,591	174	--	12	121	307	107	27	52	186	2,084
17	682	133	--	--	--	815	37	--	6	35	78	1	5	108	114	1,007
18	98	--	22	--	--	120	281	99	13	142	535	15	73	71	159	814
19	172	183	--	32	--	387	66	85	2	37	190	1	1	1	3	580
20	12	6	--	1	--	19	28	7	--	2	37	1	1	--	2	58
United States	8,284	1,924	435	45	119	10,807	1,376	317	135	1,000	2,828	1,030	226	279	1,535	15,170

(Continued on next page)

Table 34 continued.

a/ United States data: Agricultural Marketing Service, The Feed Situation, Washington, Fd S-178, Nov. 1959, pp. 20 and 45.

b/ Regional production data: U. S. Bureau of the Census, Animal and Vegetable Fats and Oils, 1957, Washington, 1958. (Facts for Industry Series M-28-1-07.)

c/ Regional production estimates are based on information reported by George Kramer and C. B. Gilliland, Processing the Three Major Oilseeds, Washington, Agricultural Marketing Service, Marketing Res. Rept. 58, 1954, pp. 29 and 34. Production of linseed meal is allocated as follows: Minnesota (72%); California (7%); other states (21%), with production allocated on the basis of numbers of processing plants. Production of copra meal is allocated as follows: California (90%); Texas (5%); Oregon (5%).

d/ Regional production is allocated on the basis of production of "peanuts picked and threshed", as reported in Agricultural Marketing Service, Crop Production, 1957 Annual Summary, Washington, Cr Pr 2-1 1958.

e/ Regional production of tankage and meat scraps was estimated as follows: (1) a special tabulation of production by regions for 1957 is reported in King, Gordon A., Demand and Price Structure for Byproduct Feeds, Washington, U. S. Department of Agriculture Tech. Bul. 1183, 1958, p. 55. (2) Regional percentages of United States total are as follows: North Atlantic (19.2%); East North Central (27.5%); West North Central (20.8%); South Atlantic (8.1%); South Central (11.1%); Mountain (2.3%); and Pacific (11.0%). These percentages were used to estimate regional production for the year beginning October, 1957. (3) Since the study utilizes different regional groupings, estimates of the relative importance of the various states within each region were made based on the number of cattle and calves slaughtered in 1958. (4) State totals were then aggregated for regional totals shown here.

f/ Regional production estimates of fish meal, fish solubles, and homogenized condensed fish are based on 1958 calendar year data reported in U. S. Fish and Wildlife Service, Canned Fish and Byproducts--1958, Washington, CFS No. 2021, rev., Annual Summary.

g/ Regional production of dried and concentrated skim milk and buttermilk, and dried, concentrated, and condensed whey is allocated on the basis of the 1958 "whole milk used in manufactured dairy products," as reported in Agricultural Marketing Service, Production of Manufactured Dairy Products--1958, Washington, Da 2-1, 1959.

h/ Regional use of skim milk, buttermilk, whole milk, and whey fed on farms is allocated on the basis of the 1958 "milk fed to calves on farms where produced," as reported in Agricultural Marketing Service, Milk, Farm Production, Disposition, and Income, Washington, Da 1-2, 1960.

TABLE 35

Other Byproduct Feeds: Production by Regions in Thousands of Tons, Year Beginning October 1, 1957

Region	Wheat mill-feeds a/	Rice mill-feeds b/	Dried and molasses beet pulp b/	Alfalfa meal c/	Rye mill feeds d/	Hominy e/	Oat mill-feeds f/	Molasses g/	Screenings h/	Total
1	337	--	56	18	1	--	1	31	33	477
2&3	114	55	183	187	--	23	25	102	11	700
4	--	--	--	7	--	--	--	--	--	7
5	158	--	95	13	--	--	--	54	16	336
6	--	--	--	8	--	--	--	--	--	8
7	51	--	62	14	--	--	--	34	5	166
8	81	--	102	123	--	--	--	56	8	370
9	--	--	--	10	--	--	--	--	--	10
10	57	--	23	16	--	12	--	13	6	127
11	796	--	44	571	6	33	7	24	79	1,560
12	450	62	--	36	2	85	--	2	45	682
13	543	--	39	28	4	--	12	22	54	702
14	773	1	--	86	6	105	45	102	76	1,194
15	100	124	--	10	--	76	--	384	10	704
16	415	--	51	119	2	76	190	40	41	934
17	100	--	--	10	--	103	--	--	10	223
18	603	--	--	32	5	41	36	2	60	779
19	100	--	--	--	--	80	--	--	10	190
20	--	--	--	--	--	--	--	141	--	141
United States	4,678	242	655	1,288	26	634	316	1,007	464	9,310

a/ Data for United States and 19 major producing states: United States Bureau of the Census, Flour Milling Products: 1958, Washington, 1959. (Facts for Industry Series M 16.) Production for "other states" of 450 thousand tons was arbitrarily allocated to the wheat producing states (50 thousand tons each) of Pennsylvania, Wisconsin, Kentucky, Tennessee, Virginia, North Carolina, Louisiana, Arkansas, and Idaho.

b/ United States data: Agricultural Marketing Service, The Feed Situation, Washington, Fd S-178, Nov. 1959. Regional estimates are based on production in 1957 as reported in: Agricultural Marketing Service, Crop Production 1957, Annual Summary, Cr. Pr. 2-1, 1958.

(Continued on next page.)

Table 35 continued.

c/ United States data: Agricultural Marketing Service, The Feed Situation, Washington, Fd S-178, Nov. 1959, Regional estimates are based on state production for the year beginning May 1, 1957, as reported in Agricultural Marketing Service, Alfalfa Meal Production, Grain Division mimeo, May 1959.

d/ United States data: U. S. Bureau of the Census, Flour Milling Products: 1958, Washington, 1959. (Facts for Industry Series M-16.) Regional location of production is assumed to be similar to that for wheat millfeed production.

e/ Production for the United States is assumed to equal that for 1954, as reported in: U. S. Bureau of the Census, Grain Mill Products, Washington, 1957, p. 12. (Census of Manufacturers, 1954, MC-20D.) Regional location of production is assumed to be similar to that for "dry-milling" of corn (see Table 32).

f/ Production for United States is assumed to equal that for 1954, as reported in: U. S. Bureau of the Census, Grain Mill Products, Washington, 1957, p. 12. (Census of Manufacturers, 1954, MC-20D.) Regional location of production is assumed to be similar to that for oat "cereal breakfact food" see Table 32).

g/ Data related to mainland production of feed and industrial molasses, as reported in: Agricultural Marketing Service: Molasses, Feed and Industrial, Annual Market Summary, 1959, Washington, AMS-79. Regional production estimates were made for cane (254,000 tons); beet (363,000 tons); refiners' blackstrap (234,000 tons); citrus (37,000 tons); and hydrol (119,000 tons). Production of cane and refiners' blackstrap molasses is assumed to be similar to that for "production of sugarcane for sugar," as given in Agricultural Marketing Service, Crop Production 1957 Annual Summary, Washington, Cr. Pr. 2-1, 1958. Production of beet molasses is assumed to be similar to that for sugar beet production, given in Crop Production. Production of citrus molasses is that reported by the Florida Citrus Processors Association, and all production is allocated to Florida. Production of hydrol is a byproduct obtained from the corn wet-milling industry, with regional production corresponding to that shown for this industry (see Table 32).

h/ No data are available on screenings production and these data are subject to large error. Regional location of production is assumed to be similar to that for wheat millfeed production.

TABLE 36

Stocks and Trade of Byproduct Feeds: October 1, 1957 and 1958, by Regions, in Thousands of Tons

Region	Stocks at Processors' Plants										Trade	
	soybean meal[a]		cottonseed meal[a]		linseed meal[b]		alfalfa meal[c]		all byproduct feeds			
	Oct. 1, 1957	Oct. 1, 1958	Oct. 1, 1957	Oct. 1, 1958	Oct. 1, 1957	Oct. 1, 1958	May 1, 1957	May 1, 1958	Oct. 1, 1957	Oct. 1, 1958	imports d/	exports e/
1	--	--	--	--	1	--	1	1	2	1	75	--
2&3	1	--	50	7	5	3	6	12	62	22	253	--
4	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	1	--	1	--	--
6	--	--	13	4	--	--	--	--	13	4	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	4	8	4	8	--	--
9	--	--	2	1	--	--	1	1	3	2	--	--
10	--	--	--	--	--	--	1	1	1	1	--	--
11	1	1	--	--	1	--	17	37	19	38	--	--
12	1	1	93	31	2	1	1	3	97	36	298	7
13	3	2	--	--	51	21	1	1	55	24	--	14
14	26	26	1	1	1	--	3	5	31	32	--	150
15	4	2	29	11	--	--	--	--	33	13	431	63
16	12	10	--	--	1	--	5	9	18	19	--	50
17	5	5	3	2	--	--	1	1	9	8	--	--
18	--	--	--	--	2	1	1	3	3	4	467	50
19	2	1	19	14	--	--	--	--	21	15	155	--
20	--	--	--	--	--	--	--	--	--	--	89	--
United States	55	48	210	71	64	26	42	83	371	228	1,768	334

a/ U. S. Bureau of the Census, Animal and Vegetable Fats and Oils 1957, Washington, 1958. (Facts for Industry Series M 28 - 1-07) and (Facts for Industry Series M 28 - 1 - 08).

b/ United States total: Agricultural Marketing Service, The Feed Situation, Washington, Fd S-178, Nov. 1959. Regional location of stocks assumed to correspond to that for linseed meal production.

(Continued on next page.)

Table 36 continued.

c/ United States total: Agricultural Marketing Service, Alfalfa Meal Production, Kansas City, Grain Division Market Report, mimeo, May 1958. Regional location of stocks assumed to correspond to that for alfalfa meal production.

d/ Includes imports (in thousands of tons) of soybean meal (1); cottonseed meal (72); linseed meal (8); copra meal (68); fish meal and solubles (92); meat scraps (12). These data are reported in The Feed Situation. Molasses imported for feed (1,515) is derived by taking the difference between total feed use (2,522) and domestic mainland production (1,007), as reported in: Agricultural Marketing Service, Molasses, Feed and Industrial, Annual Market Summary, 1958, Washington, AMS-79, 1958. This estimate implicitly assumes domestic production is used for feed. Regional allocation of these imports is only a rough approximation due to lack of data.

e/ Includes exports (in thousands of tons) of soybean meal (300); cottonseed meal (7); and linseed meal (14), as reported in The Feed Situation. Regional allocation of these exports is only a rough approximation due to lack of data. Note: Trade data for wheat millfeeds were not included since imports of 92 thousand tons were almost balanced by exports of 79 thousand tons.

For sorghum grain, calendar year net exports equaled 1,568 thousand tons as compared to 1,607 thousand tons for the October year. For oats, calendar year net exports equaled 258 thousand tons as compared with 18 thousand tons for the year beginning July 1957.

Data on barley and rye are reported as one item in Waterborne Commerce of the United States, and therefore separate estimates were made, as follows: Rye imports (91 thousand tons) for the year beginning July 1, 1957, as reported in The Wheat Situation, were subtracted from total barley and rye imports of 467 thousand tons for the calendar year 1958, giving imports of barley of 378 thousand tons. Similarly, rye exports (99 thousand tons) were subtracted from barley and rye exports of 2,994 thousand tons, giving derived exports of 2,895 thousand tons. Net exports of barley then equaled 2,517 thousand tons for the 1958 calendar year, as compared with net exports of 1,616 thousand tons for the year beginning July 1, 1957, as reported in The Feed Situation. Total feed grain net exports equaled 9,173 thousand tons for the calendar year 1958, as compared with 8,298 for the October year for corn and sorghum grain and the July year for oats and barley. Data on foreign trade of the feed grains are given in Table 37. The estimated barley net trade data, by region, are given in Table 41.

Imports and exports of the oilseed meals, fish meal and solubles, meat scraps, and molasses are indicated in Table 36. United States trade of these feeds are reported in The Feed Situation. Regional data are only rough approximations and are not shown separately for the individual feeds.

Domestic Shipments

Water.--Domestic shipments of the feed grains and "animal feeds not elsewhere classified" are reported by calendar year in Waterbourne Commerce of the United States. Receipts, shipments, and net shipments, by region, are summarized in Table 37. As in the case of foreign shipments and for rail shipments, barley and rye data are reported as one figure, and an estimate had to be made

TABLE 37

Domestic and Foreign Water Receipts and Shipments of Feed Grains and Animal Feeds, Not Elsewhere Classified, by Regions, in Thousands of Tons, Calendar Year 1958

Item	Region												United States
	1	2&3	11	12	13	14	15	16	17	18	19	20	
Corn:													
Domestic:													
Receipts	--	1	--	18	6	41	1,549	34	872	1,385	11	53	3,970
Shipments	--	1	54	3	1,972	1,730	28	141	8	28	5	--	3,970
Net balance	--	--	-54	15	-1,966	-1,689	1,521	-107	864	1,357	6	53	--
Foreign:													
Imports	--	--	--	9	--	--	21	--	--	--	--	--	30
Exports	20	96	--	545	134	241	2,150	365	--	775	532	2	4,860
Net trade	-20	-96	--	-536	-134	-241	-2,129	-365	--	-775	-532	-2	-4,830
Oats:													
Domestic:													
Receipts	--	--	--	14	19	106	155	34	110	155	--	22	615
Shipments	--	--	--	--	534	40	9	28	4	--	--	--	615
Net balance	--	--	--	14	-515	66	146	6	106	155	--	22	--
Foreign:													
Imports	--	--	--	--	--	--	--	78	--	69	--	--	147
Exports	36	--	--	41	--	--	103	--	--	116	107	2	405
Net trade	-36	--	--	-41	--	--	-103	78	--	-47	-107	-2	-258
Barley and Rye:													
Domestic:													
Receipts	28	2	--	6	51	--	98	64	16	347	--	--	612
Shipments	--	--	--	--	443	9	1	52	--	107	--	--	612
Net balance	28	2	--	6	-392	-9	97	12	16	240	--	--	--
Foreign:													
Imports	--	--	--	--	302	72	--	49	--	46	--	--	469
Exports	1,029	480	--	486	5	8	177	21	--	568	220	--	2,994
Net trade	-1,029	-480	--	-486	297	64	-177	28	--	-522	-220	--	-2,525

(Continued on next page.)

[illegible]

[illegible]

[illegible]

Table 37 continued.

Item	Region												United States
	1	2&3	11	12	13	14	15	16	17	18	19	20	
Sorghum Grain:													
Domestic:													
Receipts	--	--	--	5	26	2	24	129	9	3	--	6	204
Shipments	--	--	--	46	129	1	4	24	--	--	--	--	204
Net balance	--	--	--	-41	-103	1	20	105	9	3	--	6	--
Foreign:													
Imports	--	--	--	--	--	--	--	--	--	--	--	--	--
Exports	--	65	--	1,474	--	--	28	--	--	--	--	1	1,568
Net trade	--	-65	--	-1,474	--	--	-28	--	--	--	--	-1	1,568
Animal Feeds not Elsewhere Classified.													
Domestic:													
Receipts	34	1	--	2	20	3	248	127	3	28	--	9	475
Shipments	41	46	--	13	141	--	73	18	98	45	--	--	475
Net balance	-7	-45	--	-11	-121	3	175	109	-95	-17	--	9	--
Foreign:													
Imports	--	52	--	--	35	--	--	7	--	9	--	25	128
Exports	76	13	--	104	--	--	287	5	--	43	5	28	561
Net trade	-76	39	--	-104	35	--	-287	2	--	-34	-5	-3	-433

Source: U. S. Department of the Army, Office of the Chief of Engineers, Waterborne Commerce of the United States, Annual Report 1958.

to obtain barley shipments (see Table 41). Net barley and rye shipments by water and by rail were obtained for each region. An estimate was then made as to rye shipments, and this was subtracted from the combined total to obtain barley shipments. The estimate of rye shipments represents quantities required to balance the regional supply (stocks, production) and distribution (seed, food and industry, ending stocks, feed use.)

Rail.--Regional rail movements for the calendar year 1958 were compile for corn, oats, barley and rye, sorghum grain, hay, soybean meal, cottonseed meal, other vegetable oil cake meal, mill products (not otherwise specified), and animal and poultry feed (not otherwise specified.) These data are reported by the Interstate Commerce Commission in Carload Waybill Statistics, State-to-State. Distribution, Manufactures and Miscellaneous, and Forwarder Traffic, for animal and poultry feed (Table 43), and Products of Agriculture for other feeds (Tables 38-42 and 44-47.) The separation of barley and rye shipments was handle as noted in the discussion under "water" domestic shipments, and as shown in Table 41.

Other.--Quantities of "other" shipments shown in Table 7 were determined by taking the regional differences between estimated concentrates fed and supplies available for feed use. These data must be considered as residuals. Truck shipments probably account for a large share of these shipments in some regions. Truck, rail, and water shipments of feeds not included in reported statistics are other elements in these data. Also, reported shipments data relate to the calendar year 1958, whereas estimated concentrates fed relate to the year beginning October 1, 1957. Errors in the feeding rates, which may be sizeable, also are reflected in these data.

TABLE 38

Corn: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin											Total inshipped
	5	8	10	11	12	13	14	15	16	17	18	
1	--	--	--	11	--	78	79	--	--	--	--	168
2&3	5	44	--	39	5	--	28	--	--	--	--	121
4	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	6	--	--	22	--	--	--	--	28
6	--	--	--	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	83	--	--	17	--	--	--	--	100
9	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	3	--	--	--	--	--	3
11	--	5	130	--	--	10	216	--	4	--	--	365
12	--	--	--	469	--	47	515	4	--	6	--	1,041
13	--	--	100	--	--	--	229	--	11	--	--	340
14	--	5	397	1,140	--	433	--	--	180	6	--	2,161
15	--	--	12	308	42	95	766	--	--	151	--	1,374
16	5	--	--	--	--	93	963	--	--	39	--	1,100
17	--	--	6	12	--	--	164	11	74	--	6	273
18	2	--	--	--	--	298	1,239	--	1,105	20	--	2,664
19	--	--	--	--	5	68	318	--	264	198	21	874
20	2	--	--	--	--	--	--	--	--	2	--	4
Total outshipped	14	54	645	2,068	52	1,125	4,556	15	1,638	422	27	10,616

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 39

Oats: Region-to-Region Movement by Rail, Calendar
Year 1958, in Thousands of Tons

Region of termination	Region of origin														Total inshipped
	1	2&3	5	7	10	11	12	13	14	15	16	17	18	19	
1	--	5	48	4	--	--	--	--	--	--	--	--	--	--	57
2&3	10	--	--	--	--	--	--	--	--	--	--	--	--	--	10
4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11	--	--	--	--	24	--	--	--	8	--	--	--	--	--	32
12	--	3	--	--	4	19	--	5	20	--	--	--	--	--	51
13	--	--	--	--	419	--	--	--	9	--	--	--	--	--	428
14	--	--	--	--	117	16	--	79	--	--	9	--	--	--	221
15	--	--	--	--	5	21	16	10	30	--	--	25	--	5	112
16	--	--	--	--	--	--	--	56	115	--	--	--	7	--	178
17	--	--	--	--	--	--	--	5	16	5	7	--	--	--	33
18	--	--	--	--	--	--	--	114	140	--	174	--	--	--	428
19	--	--	--	--	--	--	--	32	35	5	14	16	34	--	136
20	--	--	--	--	--	--	--	3	--	--	--	--	--	3	6
Total Outshipped	10	8	48	4	569	56	16	304	373	10	204	41	41	8	1,692

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source or error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 40

Barley and Rye: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin												Total in-shipped
	1	2 & 3	5	7	8	10	11	12	13	14	16	18	
1	--	27	115	697	--	--	--	--	--	--	--	--	839
2 & 3	17	--	63	--	--	--	--	--	16	--	--	--	96
4	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	6	--	--	--	--	--	--	--	--	6
6	--	6	--	--	--	--	--	--	--	--	--	--	6
7	--	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--	--	--	--	--
11	--	--	--	--	5	--	--	--	--	6	--	--	11
12	--	--	--	--	4	5	95	--	45	13	--	--	162
13	63	15	21	106	5	1,699	--	--	--	29	--	--	1,938
14	11	16	10	27	25	9	56	--	179	--	--	--	333
15	--	--	--	--	--	--	6	9	58	19	--	--	92
16	--	--	--	--	--	--	--	--	44	21	--	--	65
17	--	--	--	--	--	--	--	11	10	39	--	--	60
18	--	--	--	--	--	--	--	--	211	32	23	--	266
19	--	--	--	--	--	--	--	--	123	2	5	77	207
20	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Out-shipped	91	64	209	836	39	1,713	157	20	686	161	28	77	4,081

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 41

Barley: Estimated Net Regional Shipments, Rail and Water and Net Foreign Trade, Calendar Year 1958, in Thousands of Tons

Region	Net barley & rye shipments			Estimated rye net shipments[c]	Estimated barley net shipments[d]	Estimated barley net trade[e]
	water[a]	rail[b]	total			
	1	2	3	4	5	6
1	+28	+748	+776	-40	+816	-1,029
2&3	+2	+32	+34	+8	+26	-480
4	--	--	--	--	--	--
5	--	-203	-203	+5	-208	--
6	--	+6	+6	--	+6	--
7	--	-836	-836	--	-836	--
8	--	-39	-39	-4	-35	--
9	--	--	--	--	--	--
10	--	-1,713	-1,713	-121	-1,592	--
11	--	-146	-146	+21	-167	--
12	+6	+142	+148	+22	+126	-476
13	-392	+1,252	+860	+9	+851	+257
14	-9	+172	+163	+2	+161	+72
15	+97	+92	+189	--	+189	-160
16	+12	+37	+49	+23	+26	+49
17	+16	+60	+76	+45	+31	--
18	+240	+189	+429	+16	+413	-530
19	--	+207	+207	+14	+193	-220
20	--	--	--	--	--	--
United States	--	--	--	--	--	-2,517

a/ See Table 37.

b/ See Table 40.

c/ Required shipments to balance regional supply with regional disposition as estimated for the year beginning July 1, 1957. United States exports equaled 99 thousand tons and imports 91 thousand tons. In order to balance net shipments, imports were assumed to equal exports, and required shipments into region 13 were increased by 8 thousand tons.

d/ Derived by subtracting estimated net rye shipments (column 4) from barley and rye net shipments (column 3).

e/ United States total obtained as explained in the text (page 8). Regional net trade derived from data on barley and rye foreign trade (Table 37) and allocation of rye imports and exports among regions 13, 14, 15, 16, and 18.

TABLE 42

Sorghum Grain: Region-to-Region Movement by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of Origin							Total inshipped
	6	8	9	10	11	12	14	
1	--	172	--	--	253	--	10	435
2&3	20	134	11	--	737	296	--	1,198
4	--		--	--	6	--	--	6
5	--	4	--	--	27	--	--	31
6	--	--	--	--	5	6	--	11
7	--	--	--	--	--	--	--	--
8	--	--	--	--	237	--	--	237
9	--	--	--	--	--	10	--	10
10	--	--	--	--	--	--	--	--
11	--	21	--	--	--	--	38	59
12	--	--	18	--	563	--	456	1,037
13	--	--	--	6	--	--	--	6
14	--	6	--	84	840	6	--	936
15	--	--	--	--	27	98	94	219
16	--	--	--	--	--	--	--	--
17	--	--	--	--	--	5	12	17
18	--	--	--	4	3	--	6	13
19	--	--	--	--	6	6	30	42
20	--	--	--	--	--	--	--	--
Total outshipped	20	337	29	94	2,704	427	646	4,257

Source: U. S. Interstate Commerce Commission, *Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture*, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent *waybill* origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent *shipment* origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 43

Animal and Poultry Feed Not Otherwise Specified: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin																			Total inshipped
	1	2&3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	--	18	--	10	--	12	5	--	--	3	12	3	14	--	--	--	--	--	--	77
2&3	49	--	3	35	6	--	3	--	--	3	3	3	28	--	--	3	2	--	--	138
4	--	--	--	5	--	--	--	--	--	--	24	--	--	--	--	--	--	--	--	29
5	11	2	--	--	--	--	3	--	--	--	4	2	5	--	3	--	--	--	--	30
6	--	3	--	--	--	--	4	--	--	--	--	--	--	--	--	--	--	--	--	7
7	5	--	--	5	--	--	7	--	--	5	--	--	3	5	--	--	--	--	--	30
8	--	2	--	4	--	--	--	--	--	19	--	2	47	--	--	--	2	--	--	76
9	--	--	--	--	--	--	5	--	--	4	--	--	9	--	--	--	--	--	--	18
10	--	--	--	--	--	--	2	--	3	9	4	11	18	--	--	--	--	--	--	47
11	3	--	--	--	--	--	43	--	--	--	5	13	176	10	2	--	7	3	--	262
12	--	8	--	--	--	2	9	7	--	75	--	--	131	115	--	8	3	--	2	360
13	--	--	--	--	--	--	--	--	6	57	24	--	236	2	12	--	15	5	--	357
14	6	5	--	4	--	10	2	--	5	434	--	141	--	26	22	3	63	6	2	729
15	3	--	--	--	--	--	8	--	--	45	100	13	269	--	10	233	6	11	3	701
16	--	--	--	--	--	--	8	--	--	65	3	93	572	20	--	30	26	16	4	837
17	--	--	--	3	--	--	16	--	--	33	3	6	148	8	320	--	43	19	--	599
18	--	7	--	--	--	2	--	--	4	65	--	152	429	--	1,021	62	--	20	49	1,811
19	--	8	--	--	--	--	6	--	2	30	--	29	90	88	152	298	234	--	--	937
20	3	--	--	8	--	6	6	--	--	11	2	7	52	46	2	56	2	50	--	251
Total outshipped	80	53	3	74	6	32	127	7	20	858	184	475	2,227	320	1,544	693	403	130	60	7,296

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Manufacturers and Miscellaneous, and Forwarder Traffic (C. L.), Washington, D. C., September 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 44

Mill Products Not Otherwise Specified: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of Termination	Region of origin															Total inshipped
	1	2&3	5	7	8	10	11	12	13	14	15	16	17	18	19	
1	--	--	9	--	3	--	--	--	5	12	--	--	--	--	--	29
2&3	6	--	61	9	3	--	32	3	4	27	--	--	--	--	--	145
4	--	4	--	--	--	--	--	--	--	--	--	--	--	--	--	4
5	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	2
6	--	--	--	--	--	--	--	--	--	4	--	--	--	--	--	4
7	--	--	--	--	3	--	--	--	--	--	--	--	--	--	--	3
8	--	--	--	--	--	--	--	--	--	8	--	--	--	--	--	8
9	--	--	--	--	--	--	--	--	--	5	--	--	--	--	--	5
10	--	--	--	--	--	--	--	--	--	4	--	--	--	--	--	4
11	--	--	--	--	9	--	--	--	22	80	--	--	--	--	--	111
12	--	--	--	--	--	--	44	--	5	64	--	--	--	--	--	113
13	2	--	--	2	--	84	15	--	--	109	--	--	--	--	--	212
14	--	--	--	--	12	2	276	--	205	--	4	12	--	2	--	513
15	--	--	--	--	--	--	66	92	11	138	--	--	14	--	--	321
16	--	--	--	--	--	--	2	--	42	396	--	--	--	6	--	446
17	--	--	--	--	--	--	12	12	--	187	25	21	--	--	--	257
18	--	--	--	--	--	--	--	4	60	447	10	345	--	--	--	866
19	--	--	--	--	--	--	18	3	20	93	9	34	51	12	--	240
20	--	--	--	--	--	--	--	--	--	34	14	2	7	--	6	63
Total outshipped	8	4	70	11	30	86	465	114	374	1,610	62	414	72	20	6	3,346

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 45

Soybean Oil Cake and Meal: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin							Total inshipped
	11	12	13	14	15	16	17	
1	4	--	105	38	--	--	--	147
2 & 3	56	--	26	29	--	4	5	120
4	--	--	--	--	--	--	--	--
5	--	--	--	9	--	--	--	9
6	--	4	4	--	--	--	--	8
7	--	--	--	--	--	--	--	--
8	4	--	--	5	--	--	--	9
9	--	--	--	--	--	--	--	--
10	--	--	9	3	--	--	--	12
11	--	--	22	172	--	--	--	194
12	5	--	--	94	15	--	15	129
13	--	--	--	46	--	--	--	46
14	--	--	30	--	--	--	--	30
15	--	--	--	123	--	--	118	241
16	--	--	--	388	--	--	--	388
17	--	--	--	124	10	19	--	153
18	--	--	4	300	--	694	47	1,045
19	--	--	--	286	9	97	47	439
20	--	--	--	4	4	--	14	22
Total outshipped	69	4	200	1,621	38	814	246	2,992

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 46

Cottonseed Cake and Meal: Region-to-Region Movement, by Rail
Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin					Total inshipped
	2 & 3	6	12	15	17	
1	16	--	--	--	--	16
2 & 3	--	12	--	--	--	12
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	9	--	--	--	--	9
7	--	--	--	--	--	--
8	--	--	6	--	--	6
9	--	--	--	--	--	--
10	--	--	--	--	--	--
11	--	--	33	--	--	33
12	--	--	--	8	--	8
13	--	--	--	--	4	4
14	--	--	71	36	9	116
15	--	--	3	--	10	13
16	--	--	3	--	20	23
17	--	--	21	5	--	26
18	--	--	--	13	10	23
19	--	--	--	9	--	9
20	--	--	--	14	4	18
Total outshipped	25	12	137	85	57	316

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

TABLE 47

Vegetable Oil Cake and Meal: Region-to-Region Movement, by Rail, Calendar Year 1958, in Thousands of Tons

Region of termination	Region of origin				Total inshipped
	13	14	16	19	
2 & 3	--	3	--	--	3
11	20	--	--	--	20
12	2	--	--	--	2
14	108	--	--	--	108
15	3	--	--	--	3
16	4	--	--	--	4
17	4	--	--	--	4
18	41	2	15	--	58
19	2	--	5	--	7
20	--	--	--	4	4
Total outshipped	184	5	20	4	213

Source: U. S. Interstate Commerce Commission, Carload Waybill Statistics, 1958, State-to-State Distribution, Products of Agriculture, Washington, May 1959. The carload waybill statistics are based on a one percent sample of carload traffic terminated by Class I railways during the calendar year 1958. The data represent waybill origin and destinations and, to the extent that traffic is rebilled at intermediate points, will not represent shipment origin and destinations. Regional groupings would tend to reduce somewhat this source of error. The data presented here were obtained by multiplying the one percent sample data by 100.

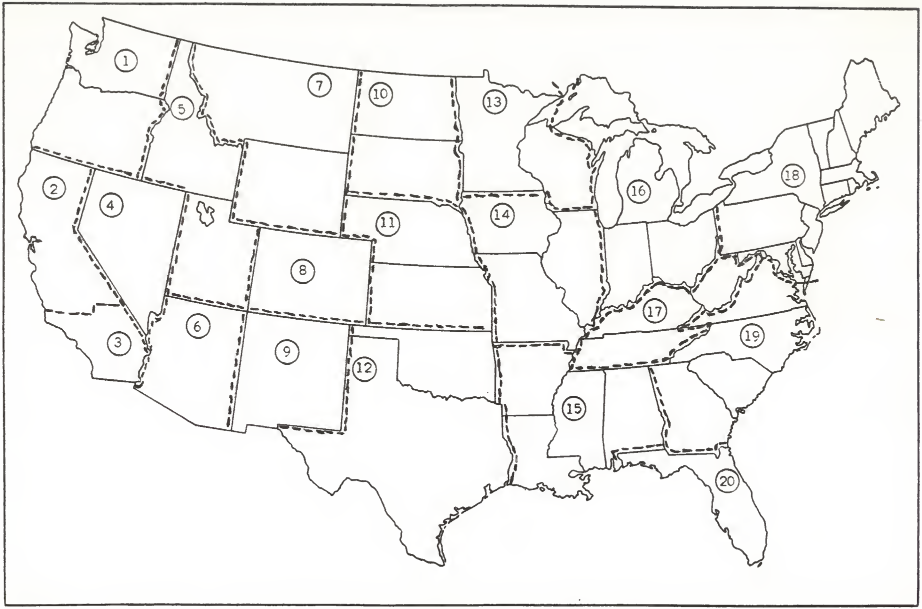

Figure 1. Map of Conterminous United States Indicating Regional Demarcations